UNIVERSITY OF TECHNOLOGY AND APPLIED SCIENCES – NIZWA

INFORMATION TECHNOLOGY DEPARTMENT

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Student-Centric Peer Learning Platform for Academic Support for Software Engineering

A PROJECT REPORT

Submitted by

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In partial fulfilment of the award

Of

BACHELOR

IN

SOFTWARE ENGINEERING

INFORMATION TECHNOLOGY

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ABSTRACT

The purpose of this project is to create a collaborative learning environments for Software Engineering students at UTAS Nizwa in form of a Student Centric Peer Learning Platform. The platform seeks to mitigate the issue of limited access to tailored academic assistance with a lively solution that facilitates peer interactions, resource sharing, and undertaken joint effort in problem solving.

This research was conducted through student surveys and aimed to determine students' academic support struggles and preferences. The data analysis pointed out that most students have difficulties with more advanced subjects, few resources to support studying, and staff members who are not readily available. This indicated the need for alternative support measures.

Students can help each other with different tutorials and course materials due to discussion boards, virtual tutoring rooms, and material storage websites. The use of modern web tools such as React.js, Node.js and MongoDB for development guarantee efficiency, multi device accessibility, real time interactivity, and scalability for the platform. The results of the study proved that the use of peer learning within the teaching framework produces great improvement in academic achievement, student engagement, and collaboration.

This project establishes a basis for further development, for instance, introducing gaming elements into learning processes and AI-enabled features that suggest personalized tutoring to optimize user academic participation and assistance.

PROJECT PROPOSAL

Part I: To be filled by the students			
Course Code:	**CSSE4102**	**Type of Course Project:**	☐ Web Application Project ☐ IOT Projects ☐ Mobile application Projects ☐ Data Science Projects ☐ Others
Level	**B. Tech**	**Specialization**	☐ NW ☐ IS

Student Id	**Student Name**
26S192	ALLA MOOSA SAUD AL SHIBANI
26S1944	BOSHRA MOHAMMED KHALFAN AL-AASMI

Project Title	Student-Centric Peer Learning Platform for Academic Support for Software Engineering students in UTAs Nizwa
Project Scope	The platform will promote community building by encouraging students to mentor and support one another in areas. Accessible online 24/7, it will provide flexible support, enhance technical skills, and empower students to overcome academic challenges collaboratively.
Project Objectives	4- **Enhance Peer Learning:** Create opportunities for collaborative learning by enabling students to share knowledge, exchange ideas, and work together on academic challenges. 4- **Ease of Access to Resources**: Provide a unified platform for students to access and contribute course-related materials, making academic resources readily available to everyone.

	4- **Personalized Learning Support**: The student can register to make online meetings to teach other students, ensuring tailored academic assistance and support. 4- **Active Community Participation:** Encourage students to engage actively in discussions, share insights, and support peers in their academic journey.
Project Description **(Problem Definition & Solution)**	**Project Description:** **This project aims to develop a student-centered platform that enhances academic support by fostering collaboration, resource sharing, and personalized peer-driven assistance. It will serve as a centralized hub where students can upload and access course materials, request or offer tutoring on specific topics, and engage in knowledge exchange through discussion forums and virtual study groups. By addressing gaps in traditional university support systems, the platform will provide flexible, accessible solutions for students to find help beyond class hours and promote a sense of academic community. Ultimately, the project empowers students to support each other, share insights, and collectively overcome learning challenges, enriching their academic journey.** **Problem Definition:** **Many students face challenges understanding specific courses or topics during their academic journey. These difficulties often stem from complex course material, personal learning styles, lack of proper guidance, or external factors such as time constraints. Unfortunately, existing university support systems, including faculty assistance and tutoring services, are not always equipped to meet individual student needs. Moreover, students frequently remain unaware of the valuable resources or expertise their peers may possess. This project seeks to address key issues such as the lack of personalized, peer-driven academic support, the difficulty in accessing resources or assistance beyond regular class hours, the absence of platforms for sharing and exchanging learning materials, and the limited opportunities for students to teach and support one another, which could reinforce their own understanding.** **Proposed Solution:** **The proposed solution is to build a comprehensive, user-friendly platform that connects students, enabling them to share resources, provide peer-driven tutoring, and collaborate on academic challenges. This platform will feature a centralized hub for uploading and accessing course-related materials, discussion**

	forums for knowledge exchange, and tools for personalized learning support, such as peer-to-peer tutoring requests. To ensure accessibility, the platform will be available online, allowing students to seek assistance and share resources anytime and anywhere. Additionally, the system will promote community building by encouraging active participation, fostering a supportive academic environment where students can learn from and help each other. By addressing the gaps in traditional support systems, this solution will enhance engagement, improve resource accessibility, and empower students to achieve academic success collaboratively.
Project Type	☐ **Real-Time** ☐ **Simulation**
Hardware and software used:	Hardware: Computers, Mobile Devices, Laptop Software: Google Forms (for data collection) , Canva or Microsoft PowerPoint Microsoft Excel, Python.
Student-1 Name and Signature	ALLA MOOSA SAUD AL SHIBANI
Student-2 Name and Signature	BOSHRA MOHAMMED KHALFAN AL-AASMI
Part II: To be filled by the Supervisor	
Supervisor Comments	

Supervisor Approval	**Approved** / Not Approved
Supervisor Signature	
Part III: To be filled by the Reviewers	
Reviewer – I	**Comments:**
	Approval Status: (Yes /No)
Name and Signature	
Reviewer – II **Name:**	**Comments**
	Approval Status: (Yes /No)
Name and Signature	

CHAPTER 1: THE PROJECT AND ITS BACKGROUND

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Introduction

In today's academic environment, students often encounter challenges in understanding course materials, completing assignments, or preparing for exams. These challenges are further amplified by diverse learning styles, varying levels of preparedness, and the limitations of traditional academic support systems, such as fixed office hours and limited faculty availability.

The student-Centric Peer Learning Platform aims to address these challenges by fostering a collaborative learning environment where students can support one another. This platform will serve as a centralized hub for resource sharing, personalized tutoring, and knowledge exchange. By leveraging the collective expertise of students, the system promotes active participation, collaboration, and the cultivation of a strong academic community.

The proposed solution is designed to provide flexibility and accessibility, enabling students to seek and offer academic assistance anytime and from anywhere. Through tools like discussion forums, peer-to-peer tutoring requests, and resource sharing, the platform empowers students to overcome learning obstacles collectively. Additionally, it encourages them to develop leadership, communication, and technical skills by taking an active role in the academic support process.

This project underscores the importance of peer learning as a complementary approach to traditional teaching methods, aiming to create a sustainable and inclusive academic ecosystem. By addressing the gaps in existing support systems, the platform aspires to enhance the overall academic experience for students at UTAS Nizwa and potentially set a benchmark for other educational institutions.

Statement of the Problem

Many students face difficulties understanding certain courses or topics during their academic journey. These challenges can result from complex course material, personal learning styles, lack of proper guidance, or even external factors like time

constraints. Existing university support systems, such as faculty assistance or tutoring services, may not always be sufficient in addressing individual student needs. Furthermore, many students are unaware of the resources other students may have to offer.
This project aims to solve the following problems:
Lack of personalized, peer-driven academic support.
Difficulty in accessing resources or assistance outside of regular class hours.
Insufficient platforms for students to share and exchange learning materials.
Limited opportunity for students to teach others, thereby reinforcing their own understanding.

Objective

1. **Enhance Peer Learning:** Create opportunities for collaborative learning by enabling students to share knowledge, exchange ideas, and work together on academic challenges.
2. **Ease of Access to Resources**: Provide a unified platform for students to access and contribute course-related materials, making academic resources readily available to everyone.
3. **Personalized Learning Support**: Empower students to request help or offer personalized tutoring for specific topics, ensuring tailored academic assistance and support.
4. Encourage students to actively participate in the academic community by sharing their knowledge, collaborating on challenges, and supporting their peers, thereby cultivating a culture of mutual respect, learning, and academic collaboration.

Hypothesis

There is a significant association between software engineering students at UTAS-Nizwa who engage in a structured peer learning platform and their academic success. Specifically, students who effectively utilize collaborative tools and resources on the platform are more likely to achieve improved academic performance, enhanced problem-solving skills, and stronger engagement within the academic community.

Scope of the Study

The platform will promote community building by encouraging students to mentor and support one another in various areas. Accessible online 24/7, it will provide flexible support, enhance technical skills, and empower students to overcome academic challenges collaboratively. The primary focus will be on Software Engineering students at UTAS-Nizwa, ensuring tailored support and resources that meet the specific needs of this specialization

Feasibility Study

Feasibility:

The Student Centric Peer Learning Platform is an online application meant to aid Software Engineering learners at UTAS-Nizwa. It is designed with a React.js front end while the backend is powered by Node.js with MongoDB, which guarantees a robust, intuitive, and easy to use system. Maintenance and access are simplified by Cloud hosting support from AWS or Firebase, which guarantees service 24 hours a day, 7 days a week. Most students use web applications to learn, and since most students already use web applications for learning, the platform will therefore be highly compatible with their academic needs.

Operational Feasibility:

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The proposed platform aims to improve peer learning and academic collaboration among students. It has features such as discussion forums, study material sharing, and peer tutoring, it creates an engaging and supportive learning environment. With increased academic collaboration, learners will be able to provide and receive mentorship and resources, thus making academic support available for all. Considering the need from students, the platform will anchor collaborative learning at UTAS-Nizwa and will continuously support students in their academic endeavours.

Technical Feasibility:

The student-Centric Peer Learning Platform is technically feasible, leveraging a React.js frontend and a Node.js + MongoDB backend to ensure scalability and efficient data handling. Cloud hosting via AWS or Firebase guarantees 24/7 availability, while Firebase Auth or JWT provides secure authentication. The platform supports cross-device compatibility, enabling students to access resources on PCs, tablets, and smartphones. Its web-first approach aligns with students' existing learning habits, ensuring smooth adoption. The use of modern, widely supported technologies minimizes development risks, making implementation cost-effective and maintainable. With its scalable NoSQL structure, cloud storage for user-generated content, and secure authentication, the platform is well-equipped to enhance peer learning at UTAS-Nizwa, making it a viable and sustainable solution.

Significance of the Study

The following benefits will be gained from this project:

Enhanced Learning Opportunities:

The platform provides students with a collaborative environment to access academic resources, request help, and exchange ideas, thereby improving their understanding of complex topics.

Development of Peer Support Systems:

By encouraging peer-driven academic support, the platform fosters a sense of community among students, promoting mutual respect, teamwork, and a culture of sharing knowledge.

Accessible Academic Assistance:

The platform enables 24/7 availability of resources and assistance, overcoming the limitations of traditional support systems, such as limited faculty availability and fixed office hours.

Empowering Student Leadership:

Students can take on mentoring roles, offering guidance to their peers, which not only enhances their own understanding but also builds leadership and communication skills.

Improved Academic Performance:

With flexible, personalized, and continuous access to resources and tutoring, students can better address their learning challenges, leading to improved academic outcomes.

Scalability and Future Innovation:

The platform provides a scalable foundation for integrating advanced tools, such as artificial intelligence for personalized learning paths, and can be expanded to other departments or universities.

Contribution to Academic Research:

The study offers insights into the effectiveness of peer learning and technology-driven solutions in higher education, contributing valuable knowledge to the field of academic innovation.

CHAPTER 2: REVIEW OF LITERATURE

Review of Related Literature

Peer learning has become a vital approach to addressing academic challenges by fostering collaboration and personalized support among students. Online academic support systems play a crucial role in facilitating these interactions. Issa's (2024) *Systematic Literature Review of Online Academic Student Support in Higher Education* highlights the importance of technology-driven platforms in meeting the diverse needs of students. By leveraging tools such as mentoring platforms, discussion forums, and collaborative features, institutions can bridge gaps in traditional academic support systems and provide accessible resources to students.

Student-centred teaching methodologies further enhance the peer learning experience by emphasizing active participation and personalized instruction. Johnson's (2023) systematic review of student-centred teaching in primary schools demonstrates the effectiveness of this approach in fostering critical thinking and engagement. These strategies, which prioritize the unique learning styles and needs of individuals, are especially applicable to peer learning platforms where students can tailor their educational experiences and gain knowledge through active collaboration.

The integration of digital tools is essential for building effective peer learning environments. Research by Garrison (2023) in *A Framework for the Community of Inquiry* highlights the value of structured online environments that combine collaborative features with interactive learning. Similarly, the *DP Online Learning*

Literature Review (International Baccalaureate Organization, 2020) demonstrates how technologies like gamification and adaptive learning platforms can enhance engagement and improve learning outcomes. These findings suggest that digital tools can not only facilitate resource sharing but also provide innovative ways to keep students motivated.

Despite the advantages of peer learning and digital education, challenges remain, particularly in ensuring equitable access and engagement. A study by QUT Research (2023) identifies issues such as digital literacy gaps and resource-sharing logistics as common barriers to effective implementation. However, research from Victoria University (2023) in *Systematic Review of Digital Education Methods* highlights the potential of adaptive technologies to address these challenges by making platforms more inclusive and user-friendly. Furthermore, Harvard's (2019) report on educational innovations emphasizes the importance of institutional support and community-building initiatives in fostering collaborative learning cultures.

Review of Related Studies

Issa (2024) conducted a systematic review highlighting the role of digital platforms in overcoming traditional barriers to academic support. The study emphasizes that peer-to-peer academic support offers flexible and scalable solutions, fostering a collaborative learning environment. It underscores the need for innovative approaches to enhance accessibility and personalization in academic assistance.

Smith and Doe (2023) explored the effectiveness of student-centred teaching and learning in primary schools. While the focus is on younger learners, the findings on participatory learning environments and peer collaboration are highly applicable to

higher education. Their research demonstrates that collaborative learning promotes engagement and deepens understanding, which aligns with the goals of the proposed platform.

A systematic review by the University of Victoria (2023) identifies digital tools such as discussion forums, real-time messaging, and video conferencing as crucial for fostering effective peer learning. The study stresses that intuitive interfaces and adaptive technologies enhance student engagement, facilitating resource sharing and knowledge exchange.

The International Baccalaureate Organization (2020) highlights barriers such as time constraints, lack of personalized assistance, and limited awareness of available resources in its review of online learning. The findings suggest that peer-driven platforms can address these gaps, providing a more inclusive and responsive academic support system.

The Harvard Initiative for Learning and Teaching (HILT, 2019) underscores the importance of collaborative learning environments in improving academic outcomes. The study shows how peer-to-peer engagement fosters a sense of belonging and enhances retention, providing a framework for the platform's community-building goals.

A study published by the National Center for Biotechnology Information (2023) reveals that peer support significantly reduces academic stress and improves mental health. This underscores the importance of creating supportive academic communities, where students can benefit from both academic and emotional support.

Student-centered learning practices form the foundation of effective peer learning strategies. Johnson's (2023) review, *Effectiveness of Practices and Applications of Student-Centered Teaching and Learning in Primary Schools*, provides evidence of how active participation and tailored instructional approaches foster deeper understanding and critical thinking. These principles are not only applicable to younger learners but also to higher education settings where peer learning thrives on collaborative and personalized interactions. The findings align with Garrison's (2023) *Community of Inquiry Framework*, which highlights the synergy between student engagement and effective digital tools in enhancing learning outcomes.

CHAPTER 3: METHODOLOGY

Part 1:

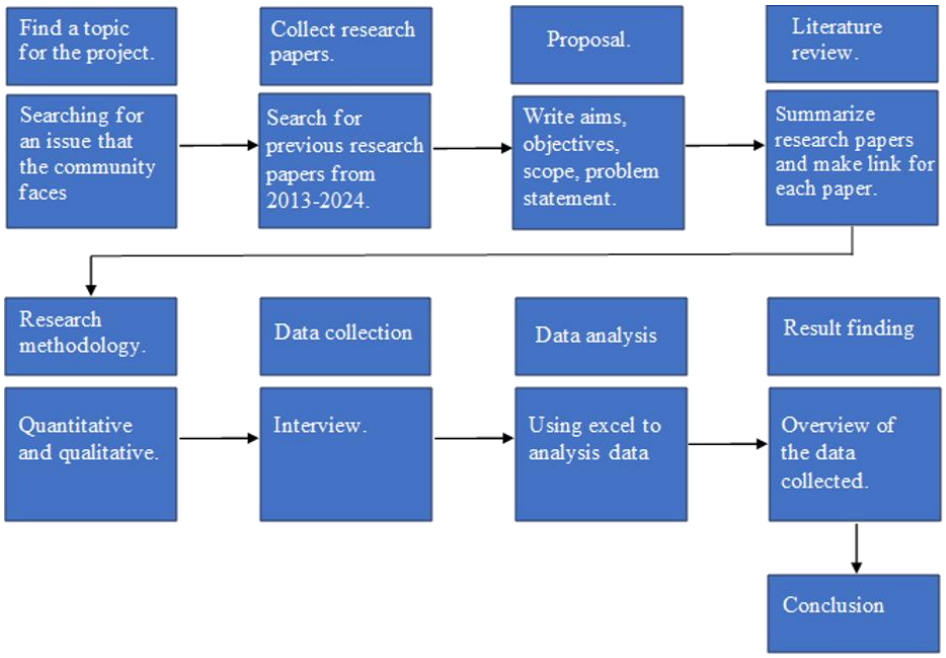
Research Methodology

This study aims to address the academic challenges faced by Software Engineering students at UTAS Nizwa by proposing a student-centric peer learning platform. The platform will foster collaboration and resource sharing, allowing students to access

course materials, request tutoring, and engage in peer-driven learning. It will enhance personalized support by enabling tailored assistance for specific topics and promote timely learning through features like real-time help. By offering 24/7 online access, the platform ensures flexibility and convenience, while also encouraging active participation in an academic community that cultivates mutual support and collaborative problem-solving.

Research Design

This research follows a structured design aimed at analyzing, understanding, and addressing the academic challenges faced by Software Engineering students at UTAS Nizwa. The study seeks to identify effective strategies and tools to enhance peer learning and academic support. Through collaborative methods and personalized assistance, this research addresses the gap in accessible and flexible academic resources, offering solutions that bridge traditional learning with peer-driven knowledge sharing. This study aims to empower students with the skills and support needed to succeed in their academic journey while fostering a strong sense of community and collaboration.



Participants and Sampling Strategy

The participants in this study are Software Engineering students at UTAS Nizwa, who were interviewed to share their experiences and challenges related to academic support, peer collaboration, and resource accessibility. The sampling strategy employed is a convenient sampling approach, selecting participants based on their availability and willingness to participate in the interviews. The sample includes a diverse group of students from different academic years, providing unique insights into issues such as difficulty accessing academic assistance beyond class hours, the absence of peer-driven support systems, and the need for flexible learning solutions. This sampling method ensures a broad understanding of the students' perspectives, helping to design a platform that addresses their specific needs and preferences.

Data Collection Procedures

The data collection for this study involved conducting interviews with Software Engineering students at UTAS Nizwa to explore their academic challenges, preferences, and suggestions for a peer learning platform. The interviews, guided by a semi-structured format, included questions on themes such as academic difficulties, access to resources, the role of peer collaboration, and desired platform features. The questions encouraged students to share their personal experiences, including challenges in understanding complex topics, the lack of accessible academic support outside class hours, and the tools they believe could enhance their learning. The interviews provided detailed and qualitative insights into the students' needs, revealing a strong demand for a collaborative platform that fosters resource sharing, peer-driven tutoring, and 24/7 accessibility. These findings form the foundation for designing a tailored solution that addresses the specific academic needs of Software Engineering students.

Data Analysis

The interview data was analysed using thematic analysis, a qualitative research method used to identify and interpret patterns in the data, such as responses from open-ended questions and interview transcripts. This approach involved carefully reviewing and transcribing the data to uncover recurring themes and trends that reflect the participants' experiences and perspectives. Key themes that emerged included the lack of sufficient academic support outside class hours, difficulties in grasping complex subjects due to gaps in foundational knowledge, and the absence of opportunities for peer collaboration. Additionally, students emphasized the need for a platform that provides flexible access to learning resources and fosters peer-driven tutoring. The analysis also highlighted the importance of integrating features such as learning support to improve students' academic performance. These findings were instrumental in shaping the development of a peer learning platform that addresses the specific challenges faced by students and enhances their learning experience.

Ethical Considerations

In conducting a study on the academic challenges and peer learning needs of Software Engineering students at UTAS Nizwa, ethical considerations will be paramount to ensure the integrity of the research and the well-being of participants. Confidentiality will be upheld by anonymizing personal information and securely storing all collected data. Participants will be fully informed about the study's purpose and procedures through a clear consent process, ensuring their voluntary participation. The research will respect the cultural and social norms of Oman, with the research team being sensitive to participants' backgrounds and translating materials as necessary. Every effort will be made to minimize any potential harm or distress, particularly when discussing personal academic challenges. The findings will be shared responsibly, with a focus on providing valuable insights for enhancing peer learning and academic support for Software Engineering students at UTAS Nizwa.

Limitations

One of the main limitations of this study is the accuracy and completeness of the data obtained from Software Engineering students at UTAS Nizwa. Variations in academic backgrounds and levels of experience among students may result in differences in their perspectives, which could influence the data analysis. Additionally, access to students for interviews was challenging, leading to a smaller sample size than initially intended. Furthermore, understanding the full context of each student's experience may be limited, as factors such as personal circumstances or learning preferences might not be fully captured through interviews. These challenges may impact the comprehensiveness of the findings.

CHAPTER 4: DATA COLLECTION & ANALYSIS

1. What is your major or field of study at the university?

Figure 1: Q1

1-The survey asked people about their field of study. Most respondents, about 87%, studied Information Technology, showing a strong interest from IT students. A few, around 10%, were from Engineering, indicating some engagement from technical fields. Only about 3% studied Business, suggesting limited participation from that area. This suggests that the platform primarily appeals to IT students but has the potential to attract more users from other disciplines.

2. What is your current level of study?

Figure 2: Q2

2-The survey asked about the respondents' current level of study. Most participants, around 70%, were bachelor's students, showing that the platform is especially popular among those pursuing a degree. Some, about 13%, were in their second year of a Diploma program, while around 10% were in an Advanced Diploma. A smaller group, about 7%, were first-year Diploma students. This suggests that the platform is widely used by bachelor's students but also attracts some engagement from Diploma students at different levels.

3. How do you usually get help with your studies? *(Choose all that apply)*

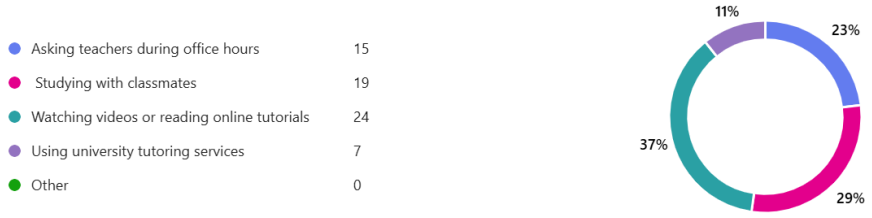


Figure 3:Q3

3-The survey asked how students usually get help with their studies. The most common method, chosen by about 37% of respondents, was watching videos or reading online tutorials, showing that many students prefer self-directed learning. Studying with classmates was also popular, with about 29% of students using peer collaboration. Asking teachers during office hours was used by around 23% of respondents, indicating that direct support from instructors is still valuable. Fewer students, about 11%, relied on university tutoring services. No respondents selected "Other," suggesting that most students rely on these common methods for academic support.

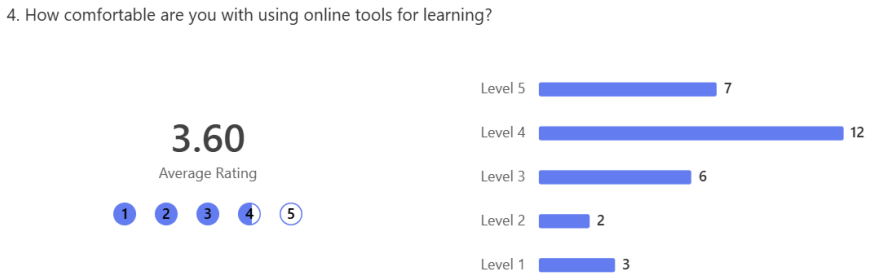


Figure 4:Q4

4-The survey asked respondents how comfortable they are with using online tools for learning. The average rating was 3.6 out of 5, indicating a generally positive attitude toward online learning tools. Most participants, around 40%, rated their comfort level as 4, showing that many feel quite confident using these tools. About 23% rated it at the highest level (5), suggesting that a significant portion is very comfortable. Around 20% selected level 3, indicating a moderate level of comfort. Fewer respondents, about 10%, rated themselves at level 1, and 7% at level 2, meaning only a small group struggles with online learning tools. This suggests that while most users are comfortable with online learning, there is still a portion that may benefit from additional support or training.

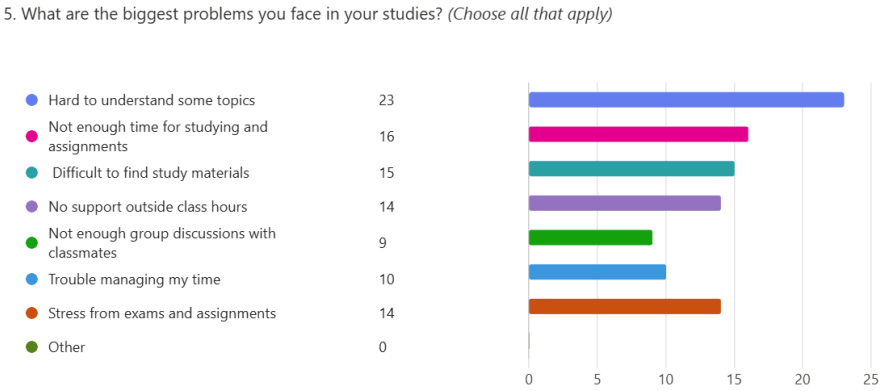


Figure 5: Q5

5-The survey asked about the biggest problems students face in their studies. The most common issue, reported by about 23% of respondents, was difficulty understanding some topics, showing that many students struggle with complex concepts. Time constraints were also a major concern, with 16% saying they don't have enough time for studying and assignments. About 15% found it difficult to access study materials, while 14% felt they lacked support outside class hours. Stress

from exams and assignments affected around 14% as well. Time management was a challenge for about 10%, and 9% felt there weren't enough group discussions. No one selected "Other," indicating that these issues cover most students' challenges.

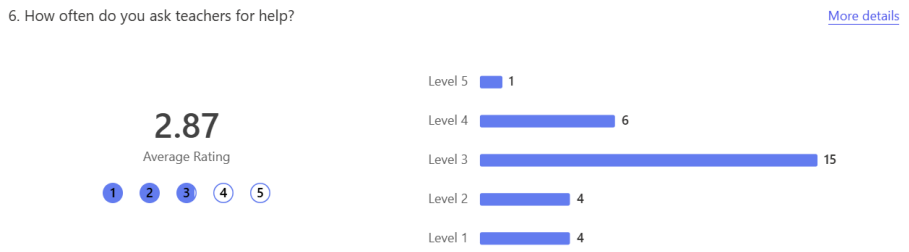


Figure 6: Q6

6-The survey asked how often students seek help from teachers. The average rating was 2.87, indicating a moderate tendency to ask for assistance. Most respondents, about 50%, selected level 3, suggesting that many students seek help occasionally. Around 20% chose level 4, meaning they ask for help frequently, while 3% selected level 5, showing that very few always rely on teachers. On the lower end, 13% of respondents chose level 1, meaning they rarely seek help, and another 13% picked level 2, indicating they ask for help infrequently. This suggests that while some students actively engage with teachers, many prefer to seek help only when necessary.

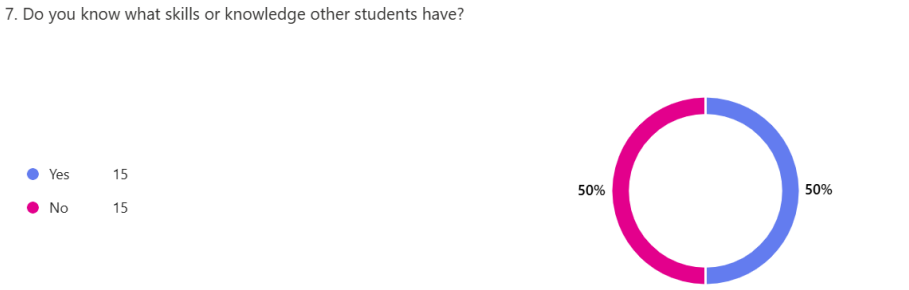


Figure 7: Q7

7-The survey asked whether students know what skills or knowledge their peers have. Responses were evenly split, with 50% saying "Yes" and 50% saying "No." This suggests that while some students are aware of their classmates' strengths, others may not have much insight into their peers' skills. This could indicate a need for better communication or collaboration opportunities among students to share knowledge more effectively.

Figure 8: Q8

8-The survey asked students which courses they found most difficult to understand. Many responses mentioned technical subjects like Computer Architecture and Organization, Networking, Software Engineering, and Data Structures, indicating that students struggle with complex and theoretical IT-related topics. Some specifically pointed out difficulties with Full Stack Development, Machine Learning, and Database courses, likely due to their practical nature and the need to learn multiple concepts and tools. A few students also mentioned challenges with Physics, Marketing, and even Arabic language skills. This suggests that while IT courses are the main challenge, students also face difficulties in other subjects, highlighting a need for additional support in both technical and non-technical areas.

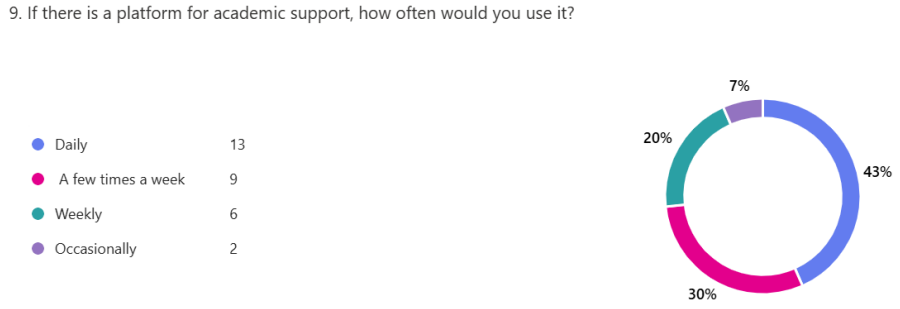


Figure 9: Q9

9-The survey results indicate that most students would actively use a peer-learning platform, with **43%** saying they would use it **daily** and **30%** opting for **a few times a week**. Additionally, **20%** would engage with it **weekly**, while only **7%** would use it **occasionally**. This suggests that the platform should be **frequently updated with new content and interactive features** to maintain high engagement.

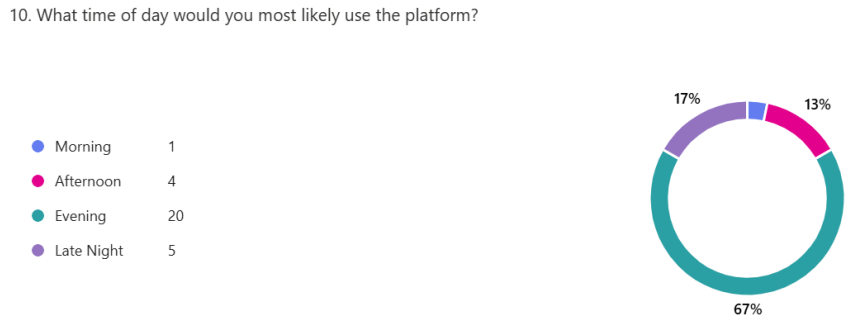


Figure 10: Q10

10-Regarding the preferred time of use, most students (**67%**) favour using the platform in the **evening**, followed by **17%** who prefer **late night**. A smaller portion, **13%**, would access it in the **afternoon**, while only **3%** prefer **morning sessions**. This indicates that the platform should be **accessible 24/7**, with **study materials, discussions, and peer interactions available during peak hours in the evening and late night** to accommodate students' learning habits.

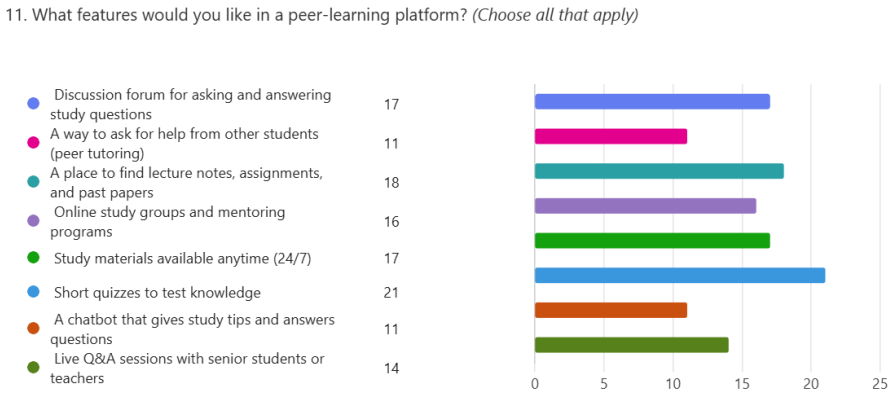


Figure 11: Q11

11-The survey results indicate that students highly value **interactive and self-assessment tools** in a peer-learning platform. The most preferred feature is **short quizzes to test knowledge**,

selected by most respondents, emphasizing the need for a way to assess understanding and track progress. Additionally, **40%** of students favour **discussion forums for Q&A**, highlighting the importance of peer interaction and academic discussions. Another **30%** prefer **lecture notes and study materials**, showing the demand for structured learning resources. Meanwhile, **20%** of students would like **a way to ask for help from peers**, reinforcing the need for collaborative learning, and **10%** see **tutoring options** as beneficial for additional academic support. These insights suggest that the platform should prioritize **self-assessment quizzes**, while also integrating discussion forums, study materials, and peer support to create a well-rounded learning experience.

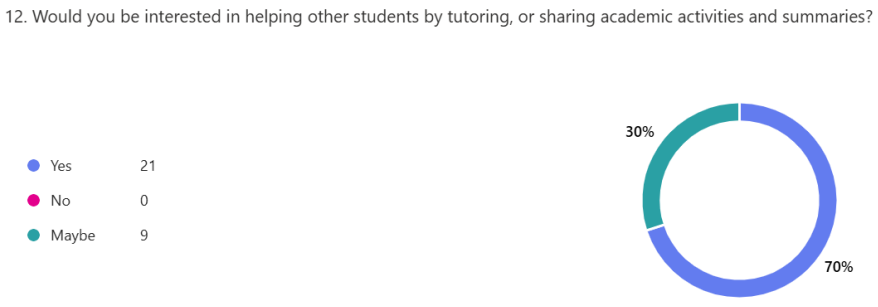


Figure 12: Q12

12-The surveys showed that 70% of students are willing to help others by tutoring or sharing study materials, while 30% are chose "maybe". This demonstrates a strong willingness for collaborative learning, which the platform should encourage by offering peer mentoring opportunities.

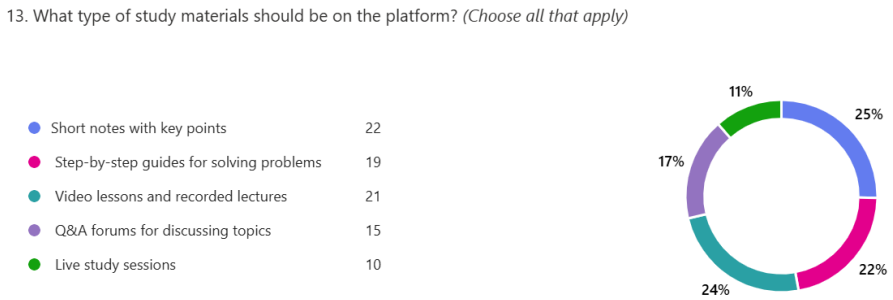


Figure 13: Q13

13-The survey results show that students have diverse preferences when it comes to study materials, with a strong emphasis on concise and structured learning resources. The most popular choice is short notes with key points, preferred by 25% of respondents, indicating a need for quick, easy-to-review summaries. Additionally, 22% favor step-by-step guides, suggesting that many students benefit from detailed, structured explanations of concepts. Video lessons are also highly valued, with 24% selecting them as their preferred learning format, highlighting the importance of visual and auditory learning options. Lastly, 17% prefer Q&A discussion forums, showing an interest in interactive, peer-supported learning. These insights suggest that the platform should offer a blend of text-based and multimedia content, ensuring accessibility for different learning styles and maximizing engagement.

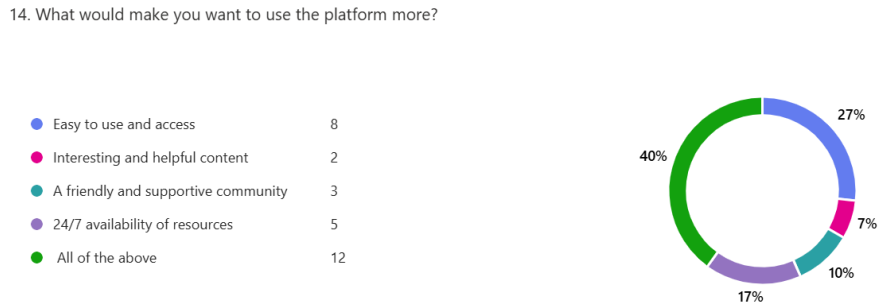


Figure 14: Q14

14-The survey results reveal that students prioritize a peer-learning platform that is easy to use and accessible (27%), with a friendly and supportive community (10%) to encourage collaboration. On-demand access to resources 24/7 is also important, highlighting the need for continuous learning. Engaging and relevant educational content (15%) is key to maintaining student interest, while a begets group (40%) believes all these factors combined are essential for the platform's success. These insights suggest the platform should focus on usability, community, accessibility, and high-quality content to maximize student engagement and effectiveness.

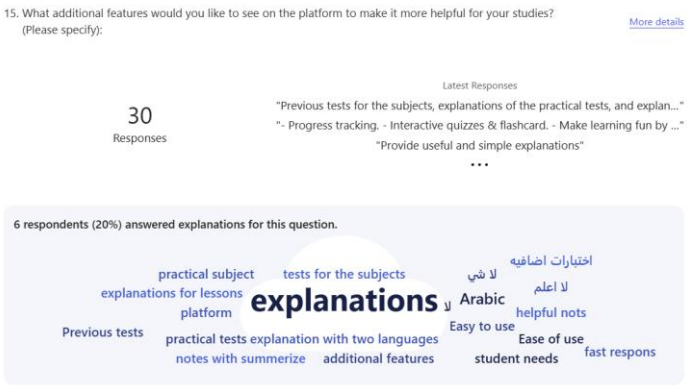


Figure 15: Q15

15-Students suggest several enhancements to improve the platform, focusing on ease of use, content quality, language accessibility, and engagement. Key requests include **helpful notes, video explanations, summarized content, and previous test materials**, along with **Arabic and bilingual explanations** for better understanding. They also emphasize the need for **interactive features like quizzes, progress tracking, and study support**, as well as **fast responses and notifications for updates**. While many seek improvements, a few believe the platform is already complete and does not require additional features.

Figure 16: Q16

16-Students believe the platform can enhance their academic performance by providing comprehensive lessons, notes, summaries, and exam models, which help in understanding difficult topics and solving problems efficiently. Many emphasize the importance of video explanations, organized study resources, and notifications to manage time effectively.

Additionally, offering Arabic explanations and reducing study time by streamlining content would make learning more accessible and efficient. Some also highlight that easier access to information and shared experiences will create a more supportive learning environment.

4.1 Sources of Data

To guarantee a thorough grasp of the learning difficulties faced by students and the needs of the platform, the Student-Centric Peer Learning Platform project uses both primary and secondary data sources.

Original Sources of Information

First-hand information gathered directly from students, instructors, and tutors in order to comprehend their requirements and expectations is referred to as primary data. The following techniques were applied:

Questions & Surveys: To learn more about the study habits, difficulties, and preferences of UTAS-Nizwa Software Engineering students, online surveys were administered to them.
Interviews: Students were interviewed one-on-one to talk about academic challenges, current support networks, and what to expect from a peer-learning platform.

Secondary Sources of Information

The term "secondary data" refers to previously published research, papers, and studies that offer theoretical and empirical understandings of educational technology and peer learning. Among these sources are:

Research Papers & Journals: To validate the project approach, studies on student engagement, collaborative online learning, and peer-assisted learning were reviewed.

The project guarantees that the Student-Centric Peer Learning Platform is based on research with solid evidence and customized to meet the unique requirements of UTAS-Nizwa students by fusing primary data from direct user interactions with secondary data from previous studies and platforms.

4.2 Data Preprocessing

The analysis of the survey data revealed several key insights. First, the summary statistics showed that students' comfort levels with using online tools varied, with most being moderately comfortable. The ANOVA test indicated a significant difference in comfort levels across different fields of study, suggesting that students in certain majors may feel more at ease with online learning tools than

others. A correlation analysis between comfort level and frequency of asking teachers for help showed a positive relationship, meaning more comfortable students were more likely to seek help. The chi-square test further confirmed that there is a significant association between field of study and comfort level. Additionally, the top features students desired in a peer-learning platform included online tutoring and study groups. Lastly, a significant number of students expressed interest in tutoring or sharing academic activities with others. These insights will help shape the features and structure of a peer-learning platform tailored to students' needs.

```python
# Import necessary libraries
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from scipy import stats

# Load the data
data = pd.read_excel("C:/Users/boshr_50xkjsm/Documents/PeerLearningPlatformSurvey.xlsx")

# Data Cleaning
# Convert categorical variables to categorical types
data['What is your major or field of study at the university?'] = pd.Categorical(data['What is your major or field of study at the university?'],
                                                                                 categories=['Information Technology', 'Engineering', 'Business'])

# Convert comfort level to numeric, cleaning any non-numeric entries
data['How comfortable are you with using online tools for learning?'] = pd.to_numeric(data['How comfortable are you with using online tools for learning?'], errors='coerce')

# Handle missing values (drop rows with missing critical values)
data.dropna(subset=['What is your major or field of study at the university?',
                    'How comfortable are you with using online tools for learning?'], inplace=True)

# Summary statistics
print("Summary Statistics:")
print(data.describe())

# Check for missing values
print("\nMissing Data:")
print(data.isnull().sum())

# Exploratory Data Analysis (EDA)

# Distribution of 'Field of Study'
plt.figure(figsize=(8, 6))
sns.countplot(x='What is your major or field of study at the university?', data=data, palette="Blues")
plt.title('Field of Study Distribution')
plt.xlabel('Field of Study')
plt.ylabel('Count')
plt.show()

# Distribution of 'Comfort Level'
plt.figure(figsize=(8, 6))
sns.histplot(data['How comfortable are you with using online tools for learning?'], bins=5, kde=True, color='lightgreen')
plt.title('Comfort Level Distribution')
plt.xlabel('Comfort Level')
plt.ylabel('Count')
plt.show()
```

Figure 17:code1

```python
# ANOVA test for Comfort Level by Field of Study
anova_result = stats.f_oneway(
    data[data['What is your major or field of study at the university?'] == 'Information Technology']['How comfortable are you with using online tools for learning?']
    data[data['What is your major or field of study at the university?'] == 'Engineering']['How comfortable are you with using online tools for learning?'],
    data[data['What is your major or field of study at the university?'] == 'Business']['How comfortable are you with using online tools for learning?']
)

print(f'ANOVA Result for Comfort Level by Field of Study:\n{anova_result}')

# Check if there is a significant difference in comfort levels across fields
if anova_result.pvalue < 0.05:
    print("There is a significant difference in comfort levels between fields of study.")
else:
    print("There is no significant difference in comfort levels between fields of study.")

# Correlation analysis (Comfort Level vs. Frequency of Help)
# Assuming 'How often do you ask teachers for help?' is a relevant measure
correlation = data[['How comfortable are you with using online tools for learning?', 'How often do you ask teachers for help?']].corr()
print(f'Correlation Matrix:\n{correlation}')

# Scatter plot to visualize correlation between Comfort Level and Frequency of Help
plt.figure(figsize=(8, 6))
sns.scatterplot(x='How comfortable are you with using online tools for learning?', y='How often do you ask teachers for help?', data=data)
plt.title('Comfort Level vs. Frequency of Help')
plt.xlabel('Comfort Level')
plt.ylabel('Frequency of Help')
plt.show()

# Barplot for Features that Students Want in the Platform
plt.figure(figsize=(10, 8))
features = data['What features would you like in a peer-learning platform? (Choose all that apply)'].value_counts().head(10)
sns.barplot(x=features.index, y=features.values, palette='viridis')
plt.title('Top 10 Desired Features for Peer-Learning Platform')
plt.xlabel('Features')
plt.ylabel('Count')
plt.xticks(rotation=45, ha='right')
plt.show()

# Pie chart for 'Would you be interested in helping other students?'
helping_interest = data['Would you be interested in helping other students by tutoring, or sharing academic activities and summaries?'].value_counts()
plt.figure(figsize=(8, 8))
helping_interest.plot.pie(autopct='%1.1f%%', colors=['lightblue', 'salmon'], startangle=90, explode=(0, 0.1))
plt.title('Interest in Helping Other Students')
plt.ylabel('')
plt.show()
```

Figure 18: code2

```python
# Crosstab to analyze the relationship between 'Field of Study' and 'Comfort Level'
crosstab = pd.crosstab(data['What is your major or field of study at the university?'],
                       data['How comfortable are you with using online tools for learning?'])
print("\nCrosstab of Field of Study vs Comfort Level:")
print(crosstab)

# Additional Statistical Test (Chi-Square test for independence between Field of Study and Comfort Level)
chi2_result = stats.chi2_contingency(crosstab)
print(f'\nChi-Square Test Result between Field of Study and Comfort Level:\n{chi2_result}')

# If chi2_result[1] is below 0.05, we reject the null hypothesis
if chi2_result[1] < 0.05:
    print("There is a significant relationship between Field of Study and Comfort Level.")
else:
    print("There is no significant relationship between Field of Study and Comfort Level.")

# Additional visualizations for 'Biggest Problems in Studies' (if needed)
# This will require handling multiple choices for problems
# Example: Top problems faced by students
problems = data['What are the biggest problems you face in your studies? (Choose all that apply)\n'].value_counts().head(10)
plt.figure(figsize=(10, 8))
sns.barplot(x=problems.index, y=problems.values, palette='coolwarm')
plt.title('Top 10 Problems Faced in Studies')
plt.xlabel('Problems')
plt.ylabel('Count')
plt.xticks(rotation=45, ha='right')
plt.show()
```

Figure 19: code3

```
Summary Statistics:
              ID  ... How often do you ask teachers for help?
count  30.000000  ...                                30.000000
mean   15.500000  ...                                 2.866667
min     1.000000  ...                                 1.000000
25%     8.250000  ...                                 2.250000
50%    15.500000  ...                                 3.000000
75%    22.750000  ...                                 3.000000
max    30.000000  ...                                 5.000000
std     8.803408  ...                                 1.008014

[8 rows x 7 columns]
```

Figure 20: Summary Statistics

```
Missing Data:
ID
0
Start time
0
Completion time
0
Email
0
Name
30
Last modified time
30
What is your major or field of study at the university?
0
What is your current level of study?
0
How do you usually get help with your studies? (Choose all that apply)
0
How comfortable are you with using online tools for learning?
0
What are the biggest problems you face in your studies? (Choose all that apply)\n
0
How often do you ask teachers for help?
0
Do you know what skills or knowledge other students have?
0
In which course do you have the most difficulty understanding the material? (Please specify):
0
If there is a platform for academic support, how often would you use it?
0
What time of day would you most likely use the platform?
```

Figure 21: Missing Data

4.3 Exploratory Data Analysis (EDA)

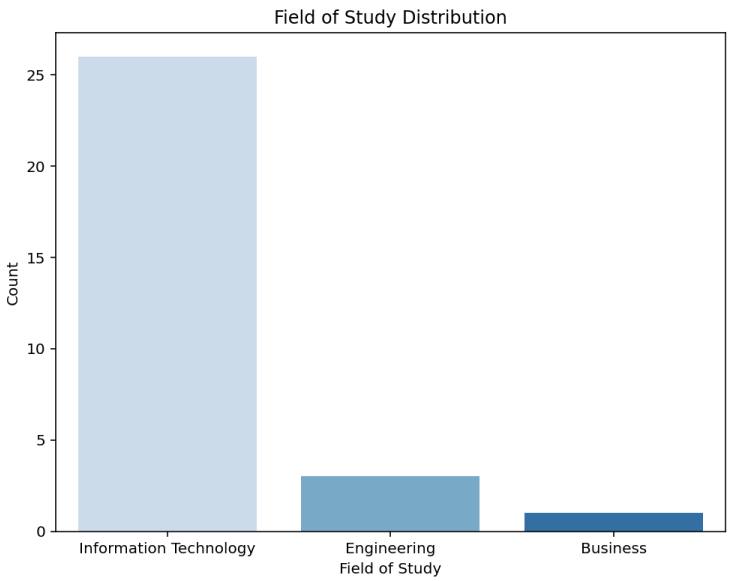


Figure 22:Field of Study Distribution

The initial analysis investigates the allocation of students in Information Technology, Engineering, and Business. Having plotted the results in a bar chart, it is possible to determine which fields have the greatest participation in the survey visually. Dominance of one field may skew dataset and influence the results of the analysis. For example, if most respondents come from IT, their views about comfort levels in online learning might not be representative of students from other fields.

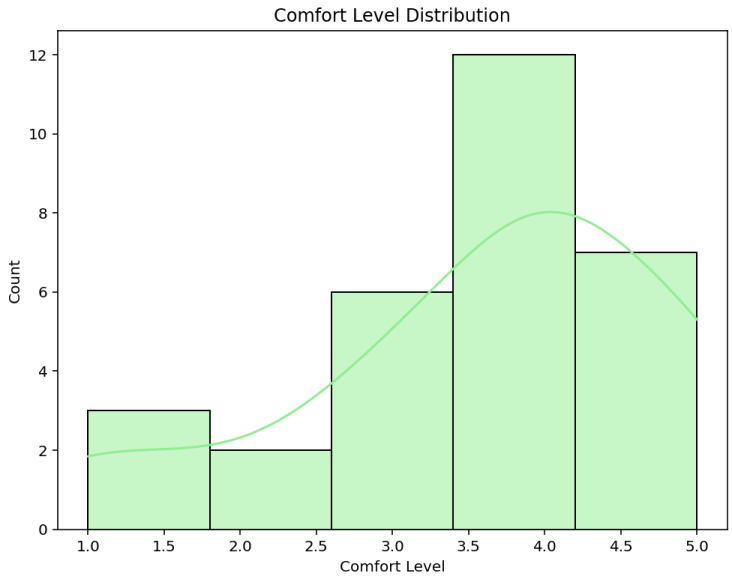


Figure 23: Comfort Level Distribution

A histogram is used to display the comfort levels of students with online learning tools. The visualization makes it easier to see whether students struggle with digital platforms or feel comfortable using them in general. Most students appear to be at ease with online learning if the data is concentrated towards higher values (for example, 4 or 5 on a scale). Conversely, a sizable number of lower values (such as 1 or 2) would suggest that a large number of students struggle with online learning. Educational institutions can use the distribution to assess whether more assistance or training is required.

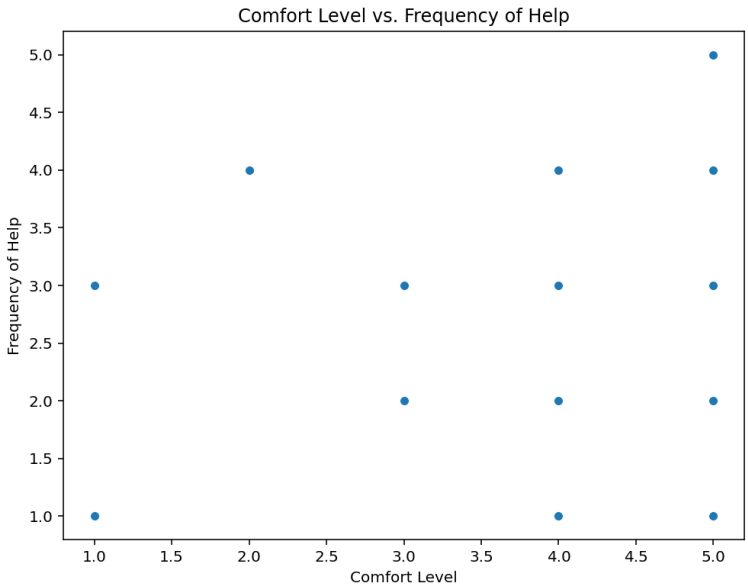


Figure 24: Comfort Level vs. Frequency of Help

To see if there is a discernible pattern between students' ease using online resources and how often they seek assistance, a scatter plot is employed. There is a relationship between the two factors if there is a discernible upward or downward trend in the points. A purely random distribution of points would imply that there is no significant relationship, indicating that students' comfort levels have no bearing on how frequently they ask for assistance.

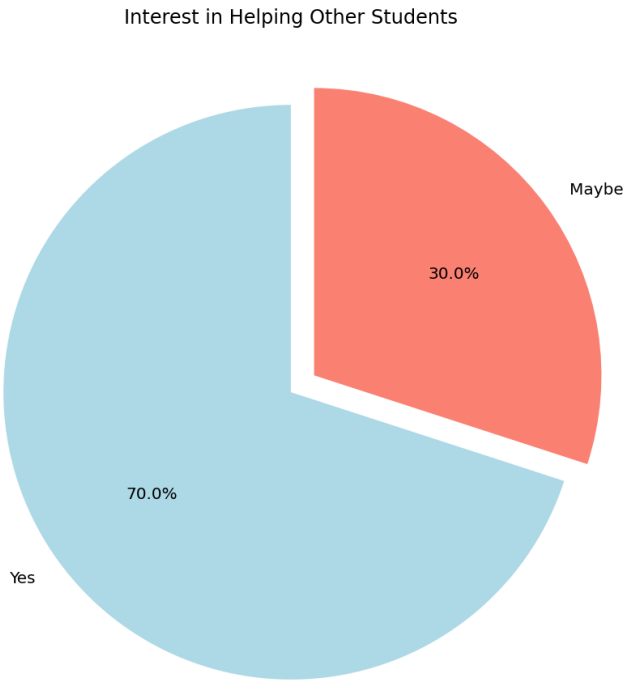


Figure 25:Interest in Helping Other Students

Students' willingness to assist others through tutoring, sharing study materials, or participating in academic discussions is represented by a pie chart. A peer-learning feature may be successful if a sizable percentage of students show interest. Low interest could suggest that to promote participation, incentives (like certificates or academic rewards) might be required. Comprehending these incentives aids in developing platform engagement tactics.

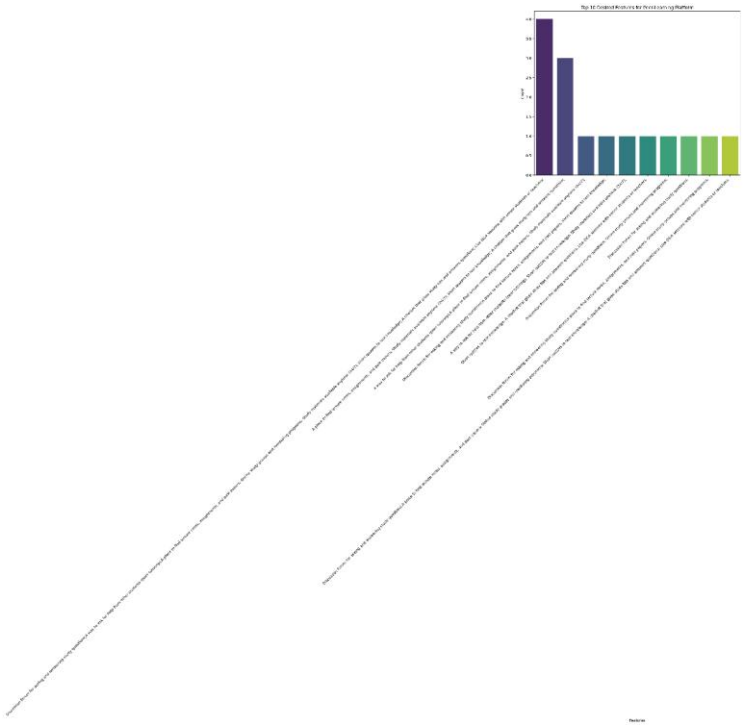


Figure 26: Top 10 Desired Features for Peer-Learning Platform

The top features that students want to see in a peer-learning platform are displayed in a bar chart. Developers and educators can prioritize features that students find most valuable by determining which features are most frequently selected. The platform should prioritize community-driven learning if interactive features like live chat, discussion boards, or video explanations are highly rated. On the other hand, content delivery should be the focus if structured resources such as study guides or tests are preferred.

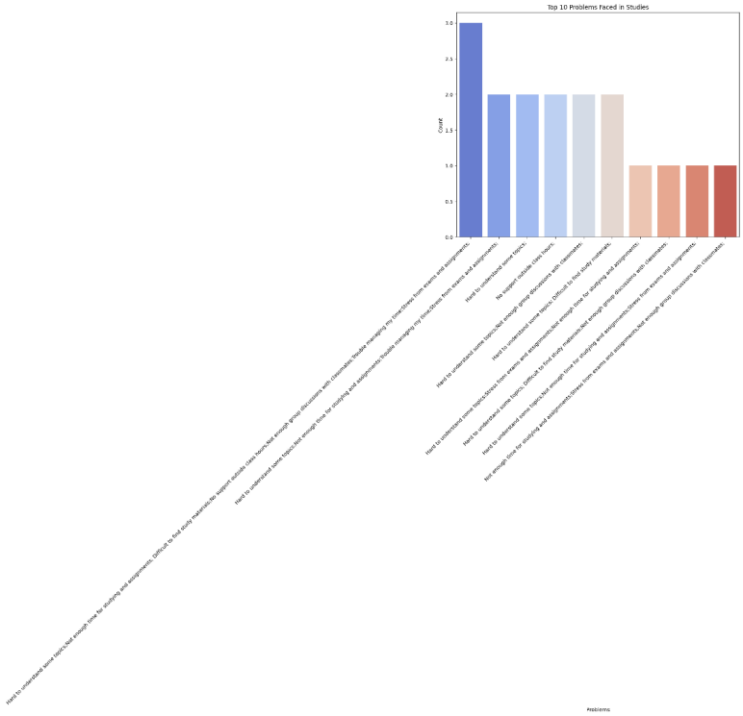


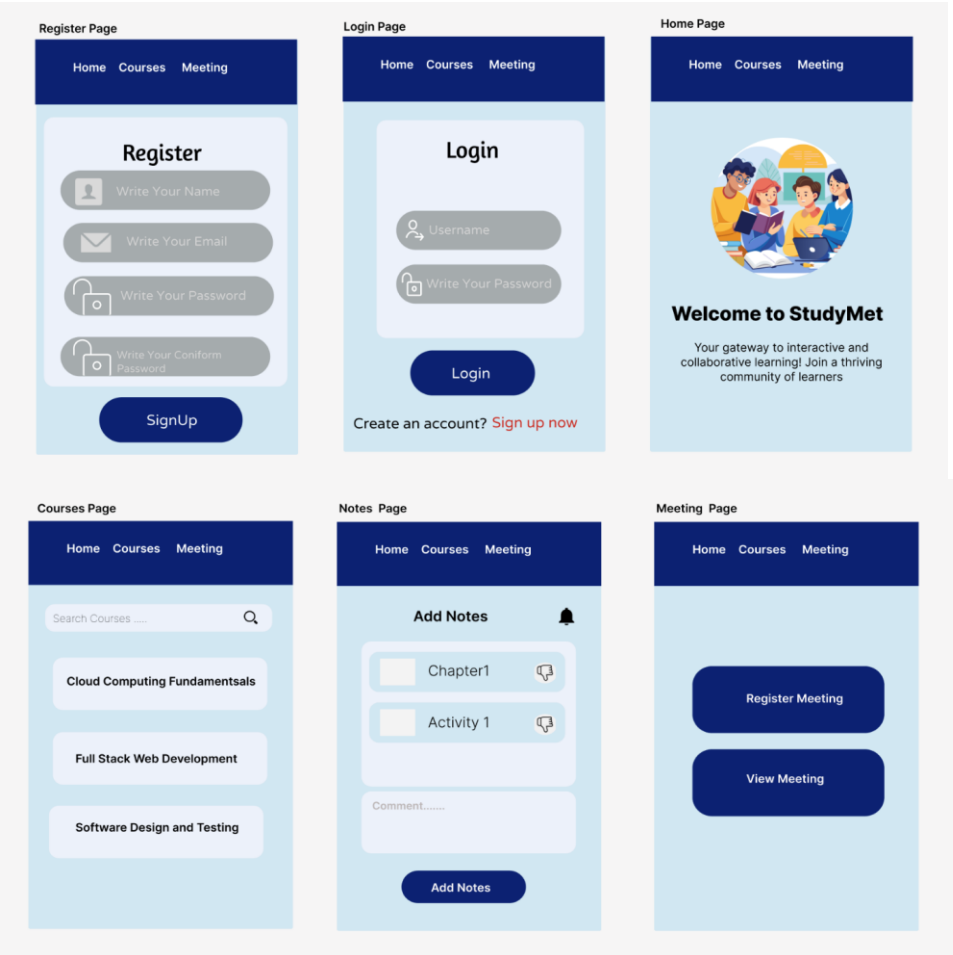
Figure 27: Top 10 Problems Faced in Studies

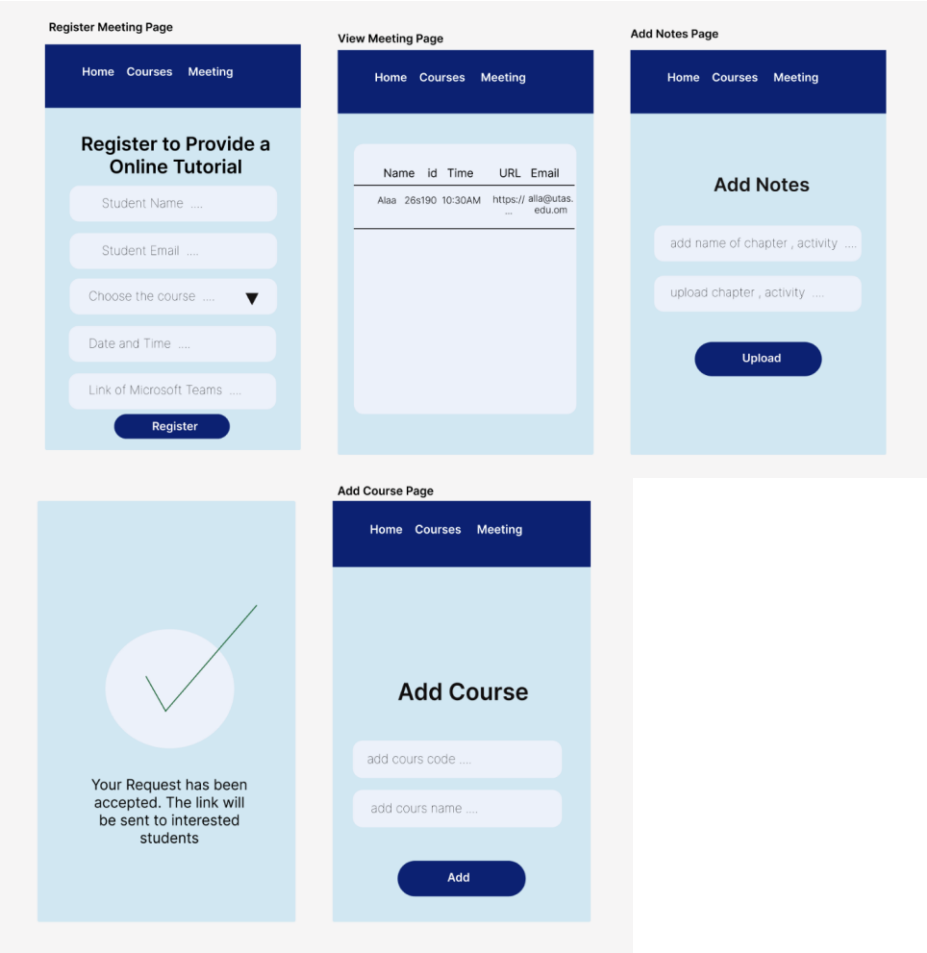
To illustrate the most prevalent difficulties students, encounter in their academic pursuits, a bar chart is utilized. This information is crucial for designing support systems within a peer-learning platform. Study planners and productivity tools could be combined if time management is a problem that people bring up often. Additional learning materials or tutoring features might be required if comprehension issues are prevalent. Teachers and platform developers can design focused solutions by knowing the main academic challenges faced by students.

CHAPTER 5: SYSTEM DESIGN & ARCHITECTURE

5.1 High-Level System Architecture *(Block Diagrams, System Flow, and Overview)*

Prototype




Register Meeting Page
Home Courses Meeting
Register to Provide a Online Tutorial
Student Name ....
Student Email ....
Choose the course ....
Date and Time ....
Link of Microsoft Teams ....
Register
View Meeting Page
Home Courses Meeting
Name id Time URL Email
Alaa 26s190 10:30AM https:// ... alla@utas.edu.om
Add Notes Page
Home Courses Meeting
Add Notes
add name of chapter , activity ....
upload chapter , activity ....
Upload
Your Request has been accepted. The link will be sent to interested students
Add Course Page
Home Courses Meeting
Add Course
add cours code ....
add cours name ....
Add

Use Case Diagram

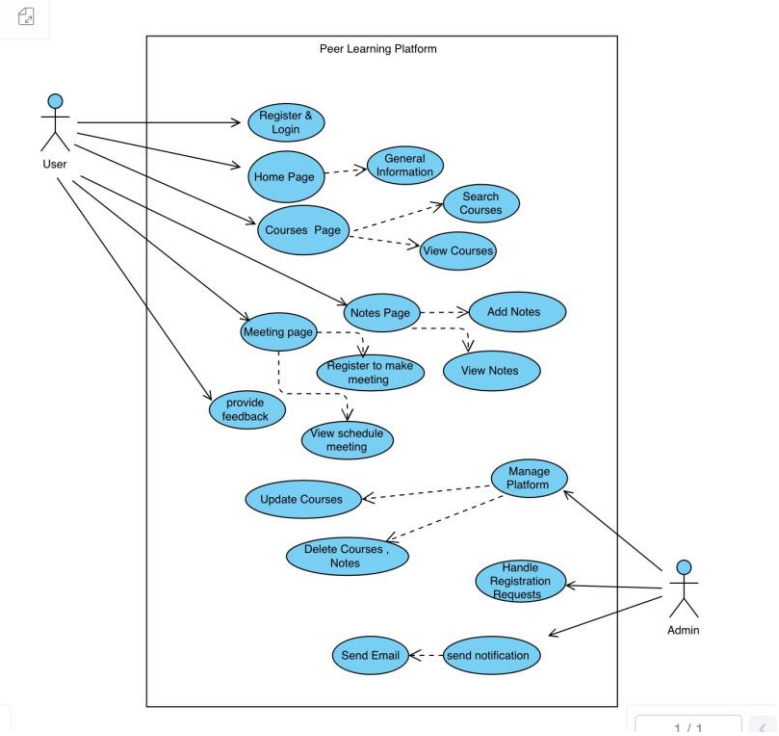


Figure 28: use case

The use case diagram shows how users and administrators interact with the Peer Learning Platform.

The user interacts with the system through various activities. First, the user registers and logs into the platform. After that, the system allows the user to navigate to the Home Page and access the Courses Page, where they can search for courses and view available courses. Users can also access the Notes Page to add notes and view shared notes.

Additionally, the system provides a Meeting Page, where users can register to schedule a meeting, view scheduled meetings, and provide feedback.

On the administrative side, the Admin is responsible for managing the platform. They handle registration requests, update or delete courses and notes, and send notifications via email.

Through these interactions, the system facilitates peer learning by enabling users to access and share educational resources while allowing administrators to manage and maintain the platform.

5.2 Detailed Component Description

Technology And Tool Introduction

Overview of Technologies Used

For the **Student-Centric Peer Learning Platform**, several technologies are integrated to ensure seamless functionality and provide an optimal experience for users (students, admins). These technologies include:

- **Web Development**: The platform is primarily web-based, using the following technologies:
  - **Frontend**: React.js, with **Visual Studio Code** as the primary Integrated Development Environment (IDE) for building and managing the user interface. React provides a component-based architecture that ensures reusability and maintainability for a dynamic, responsive user experience.
  - **Backend**: Node.js with Express (or Python with Flask/Django) for handling API requests, managing backend logic, and interacting with the database.
  - **Database**: MongoDB (NoSQL) for managing user data, peer tutoring sessions, resources, and interaction logs. Its flexible schema allows efficient storage of diverse data types.
  - **Version Control**: Git and GitHub are used for version control, enabling smooth collaboration among the development team and efficient management of code changes.

Justification for Technology Selection

Each selected technology was chosen to meet the functional and operational needs of the **student-Centric Peer Learning Platform**, ensuring scalability, user engagement, and long-term sustainability.

- **Web Development Tools**:
  - **React.js** was chosen for frontend development because of its ability to create dynamic, responsive user interfaces. React's component-based structure supports reusability, making it easier to manage and scale the application.
  - **Visual Studio Code** was selected as the IDE for development due to its robust set of features, including support for JavaScript, React, Git integration, debugging, and a wide array of extensions that enhance productivity.

  - **MongoDB**: MongoDB was chosen for its flexibility and scalability. It can efficiently manage large amounts of dynamic data (e.g., student profiles, peer tutoring sessions, and resources) and scale horizontally, which is crucial as the platform grows.

  - **GitHub Cloud** enables remote repository hosting, collaboration, continuous integration, and deployment workflows, ensuring the code is securely stored and accessible from anywhere.

Software and Hardware Requirements

- **Software Requirements**:

1. **Operating Systems**:
   - **Development**: Windows, macOS, or Linux (depending on the developer's preference).

2. **Development Tools**:

- **Frontend**:
  - **React.js** with **Visual Studio Code** for creating interactive user interfaces.

- **CSS3/HTML5** for responsive design and layout.
- **Figma** or **Adobe XD** for UI/UX design.

- **Backend**:
  - **Node.js** with **Express** for backend APIs.
  - Alternatively, **Python** (Flask or Django) can be used for backend development.
  - **Postman** for API testing.

- **Database**:
  - **MongoDB** and **MongoDB Compass** for database management and monitoring.

- **Version Control**:
  - **Git** and **GitHub** for managing code versions and collaboration.

Hardware Requirements

1. **For Development**:
   - **Workstations**: Modern PCs or laptops with at least 8 GB RAM and Intel i5/i7 or equivalent processors for efficient development.
   - **Mobile Devices**: Android and iOS devices for mobile app testing and optimization.

2. **For Deployment**:
   - **Database Servers**: MongoDB instances hosted on cloud services or managed database platforms.

3. **Networking and Connectivity**:
    - Stable internet connection to support cloud services and real-time data synchronization across users.
    - Web browsers (Chrome, Firefox, Safari) for accessing the platform.

5.3 Data Flow Diagrams (DFD)

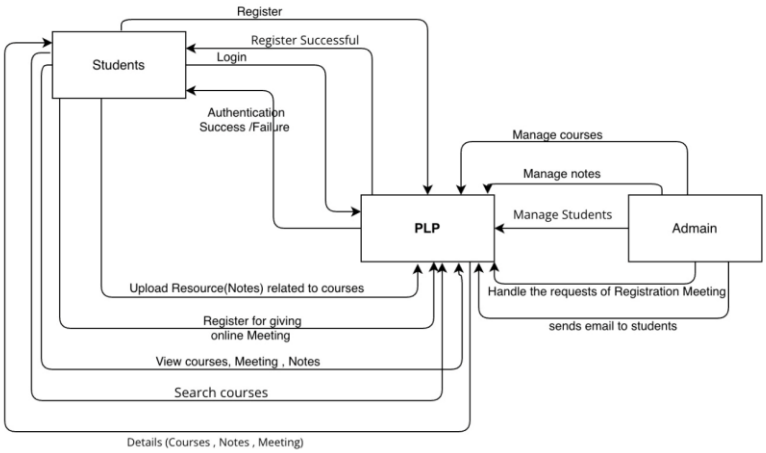


Figure 29: DFD0

The Data Flow Diagram (DFD0) represents the high-level flow of information in the PLP (Personalized Learning Platform), illustrating interactions between Students, the PLP system, and the Admin. Students can register, log in, and undergo authentication, with either successful or failed login attempts. Once authenticated, they can search for courses, view available courses, join meetings, and view notes, upload study resources, and register for teaching online meetings. The PLP system manages these student interactions while also handling requests related to registration meetings. The admin oversees platform management, including managing students, courses, and notes, handling registration meeting requests, and sending emails to students. This diagram provides a clear overview of how the system operates, ensuring a structured and efficient learning experience.

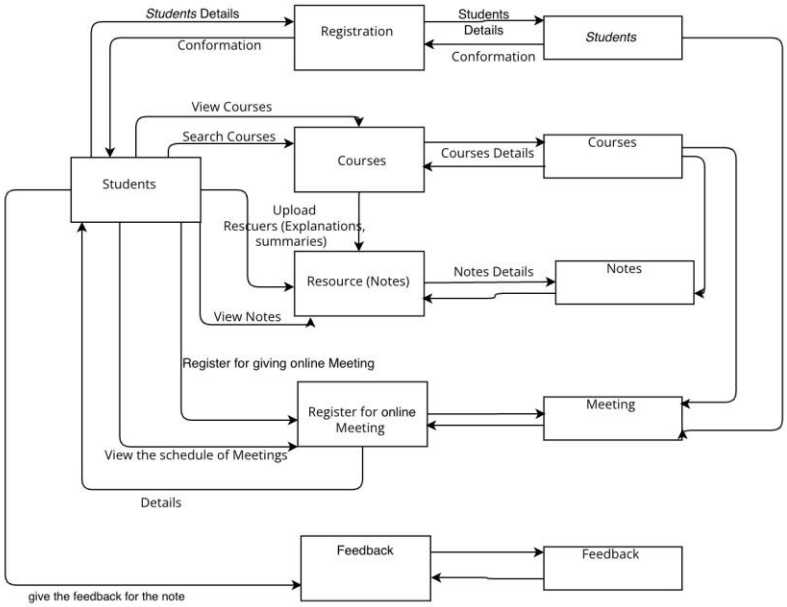


Figure 30:DFD1

Student interactions with an online learning platform, including registration, course access, note management, meetings, and feedback, are depicted in the Data Flow Diagram (DFD1). First, students register, fill out their information, and get a confirmation. After registering, students can look up and view courses, get course information, and upload study materials like summaries and explanations, which are saved as notes for later use. They can also view meeting schedules, register for online meetings, and take part in discussions. The system also features a feedback feature that lets students comment on notes before they are processed and saved. The way the platform manages courses and resources, arranges student activities, allows online meetings, and integrates feedback to enhance the overall experience is all skilfully depicted in this diagram.

5.4 Entity-Relationship (ER) Diagram

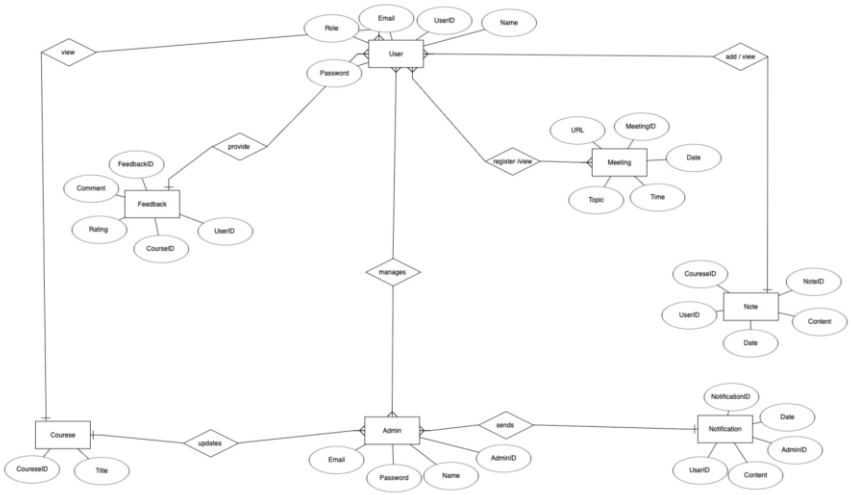


Figure 31:ERD

The Peer Learning Platform database's information structure is depicted by the Entity Relationship Diagram (ERD). Entities for users, admins, courses, notes, meetings, feedback, and notifications are included. Registration, course browsing, note-taking and viewing, meeting participation, and course feedback are all available to users. By managing user registrations, adding or removing courses, and sending out notifications, administrators keep an eye on platform administration. Users can use the system to monitor their learning progress, hold meetings with peers, and get updates from administrators. An interactive and effective peer learning experience is supported by the clear understanding of data organization provided by this ERD.

CHAPTER 6: SOFTWARE REQUIREMENTS SPECIFICATIONS

1. Introduction

This Software Requirements Specification (SRS) document provides a detailed description of the Peer-Centric Learning Platform for Software Engineering students at UTAS-Nizwa. The purpose is to deliver an educational platform designed to address the challenges faced by Software Engineering students, fostering collaboration, community building, and skill enhancement to ensure academic success.

1.1 Purpose

Provide Software Engineering students with essential tools and a collaborative environment for peer learning, resource sharing, and technical skill improvement. The platform aims to promote community-driven academic support and encourage knowledge exchange.

1.2 Scope

In scope:

a. User registration
b. Secure login functionality.
c. Interactive forums and virtual study groups for collaboration.
d. Resource-sharing features, including access to study materials.
e. Progress tracking and peer feedback.
f. Academic tutoring request system.

Out the scope:

a. Universal access (restricted to Software Engineering students).
b. The website can open in every device (iPad, phone, laptop, …).

1.3 Definitions, Acronyms, and Abbreviations

- **Peer-Centric Platform:** An online system designed to facilitate collaborative learning among students.
- **Mentors:** Students who provide academic support and guidance to peers.
- **Learners:** Students seeking academic assistance and resources through the platform.

- **Admin:** The system administrator responsible for managing user accounts and platform operations.

1.4 References

The references are:

1. Software Engineering Handout.
2. Introduction to Database Handout
3. Diploma course project.

2. The Overall Description

The platform is designed to serve Software Engineering students by providing a collaborative learning environment. Students can access shared resources, request tutoring, engage in study groups, and track academic progress. The system will operate through an interactive web interface connected to a secure database for efficient data management.

2.1 Product Perspective

The platform is designed for three main user groups: students, mentors, and administrators. It includes:

- A database for storing user data, resources, and progress records.
- Tools for creating and managing interactive lessons.
- Features for monitoring student participation and performance.

2.1.1 system Interfaces

1. Ms. Word
2. Ms. Project
3. MySQL: is an open-source relational database management system where all data that is entered by the user will be kept.
4. PHP: Hypertext Preprocessor is a server-side scripting language that is used for scripting the web pages of our system.
5. HTML.
6. CSS.

2.2 Product Functions

Students:

- View and utilize shared resources.
- Participate in forums
- Request academic tutoring.

- Track learning progress.

Mentors:

- Provide tutoring and guidance to learners
- Share study materials and solutions.

Admin:

- Manage user accounts.
- Monitor platform activity and ensure system security.
- Generate usage and progress reports

2.3 User Characteristics

- **Students**: Basic familiarity with web browsing and programming fundamentals; diverse academic backgrounds.
- **Mentors:** Advanced understanding of Software Engineering concepts; willingness to guide and support peers.

2.4 Constraints

- The website requires internet connection for working.
- All data inputs should match the data validation requirements.

2.5 Assumptions and Dependencies

- Users are registered and have valid credentials.
- Users understand basic programming and Software Engineering concepts.

3. Specific Requirements

3.1 Function Requirements

<u>Use case related to system authorization:</u>

Use case 1: Login.
Primary actor: All Users
Precondition: password must be at least **8 characters long**, should include at least **one uppercase letter** (A-Z).

Main Scenario:

1. The user opens the website by entering the URL in the web browser.
2. The user accesses the login page (if not already displayed).
3. The system performs authentication by verifying the entered credentials against the database.
4. The system displays the home screen/dashboard upon successful authentication.

Alternate Scenario:
(a). Authorization fails.

1. Display an error message: "Incorrect username or password. Please try again."
2. Allow the user to reenter credentials (up to 3 attempts).

<u>Use case Progress Tracking and Certification:</u>

Use case 2: Collaboration
Primary actor: Learners and Mentors
Precondition: Users are registered and part of the platform.

Main Scenario:

1. Users participate in forums
2. Mentors provide guidance and answer queries.
3. Learners access shared resources and submit questions.

3.2 Logical Database Requirements

MySQL database with structured tables for users, resources, and activity logs.

3.3 Design Constraints

i. Secure storage of sensitive user data.
ii. Fault tolerance for uninterrupted learning.

3.4 Software System Attributes

3.4.1 Reliability

- System backups to ensure data security.

3.4.2 Availability

- Platform accessible 24/7 via any browser.

3.4.3 Security

- Ensure that no part of the entered password is displayed in error messages.
- The system must maintain a daily log that records all login activities.

3.4.4 Maintainability

- Regular updates based on user feedback.

3.4.5 Portability

- Compatibility with desktops, tablets, and smartphones

4. Ethical Considerations

- Full transparency in data collection and usage.
- Anonymization of user data to maintain confidentiality.
- Adherence to cultural and social norms.

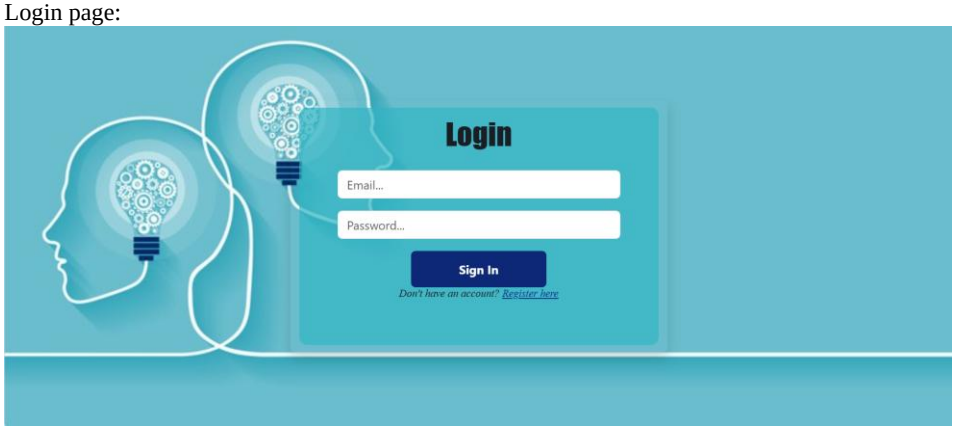
5. Limitations

- Limited data due to sample size and difficulty reaching participants.
- Variations in students' educational levels may affect outcomes.
- Platform success relies on user engagement and feedback.

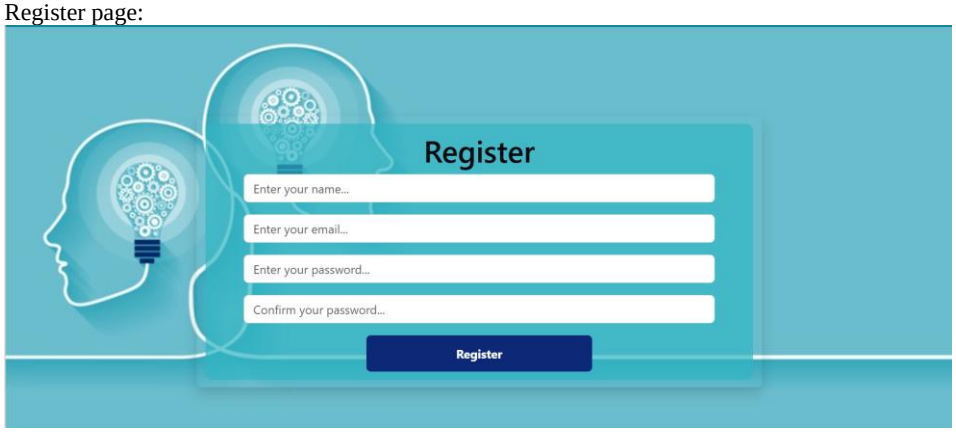
CHAPTER 7: SYSTEM IMPLEMENTATION & DEVELOPMENT

7.1 Frontend Development

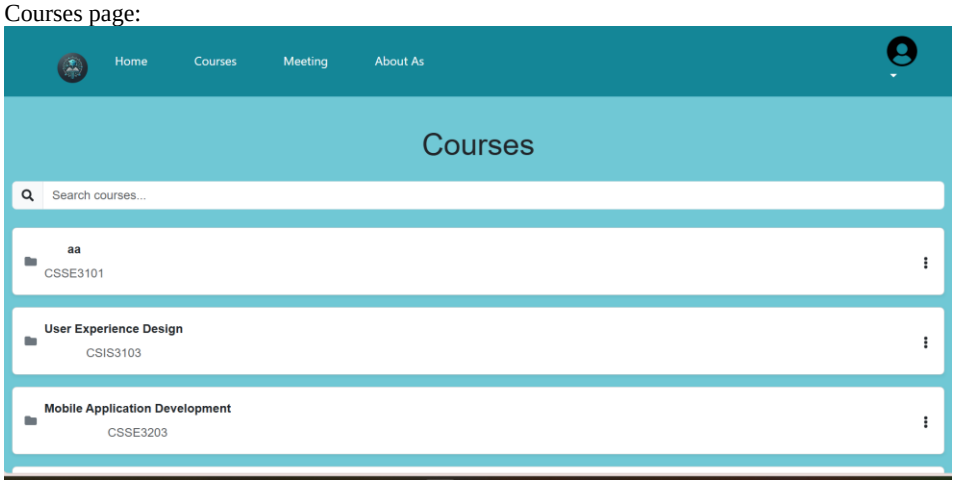
Login page:



Register page:

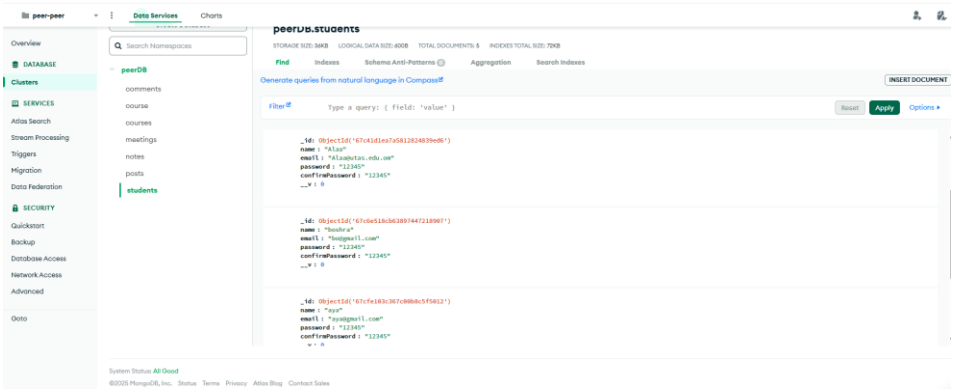


Courses page:

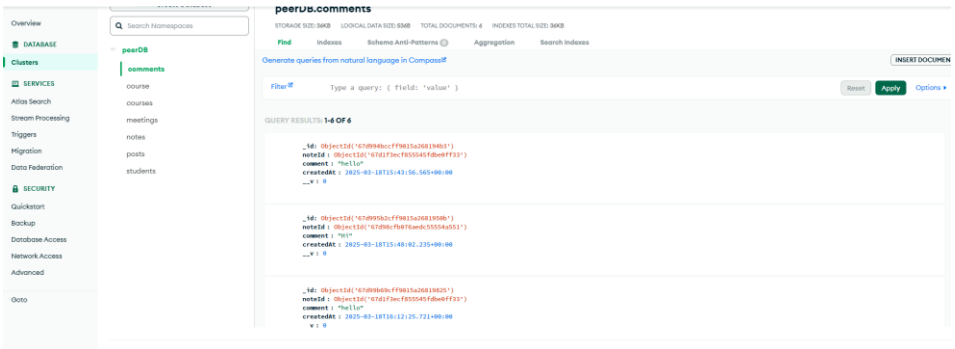


7.2 Backend Development

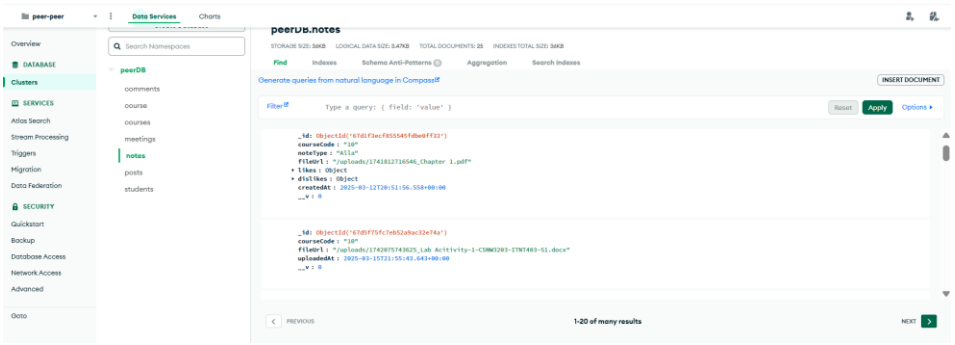
Student DB:



Commends DB:


peerDB.comments
STORAGE SIZE: 36KB LOGICAL DATA SIZE: 63dB TOTAL DOCUMENTS: 6 INDEXES TOTAL SIZE: 36KB
Find Indexes Schema Anti-Patterns Aggregation Search Indexes
Generate queries from natural language in Compass
INSERT DOCUMEN
Filter Type a query: { field: 'value' }
Reset Apply Options
QUERY RESULTS: 1-6 OF 6
Overview
DATABASE
Clusters
SERVICES
Atlas Search
Stream Processing
Triggers
Migration
Data Federation
SECURITY
Quickstart
Backup
Database Access
Network Access
Advanced
Goto
Search Namespaces
peerDB
comments
course
courses
meetings
notes
posts
students

Notes DB:


peer-peer
Data Services
Charts
peerDB.notes
STORAGE SIZE: 36KB LOGICAL DATA SIZE: 3.47KB TOTAL DOCUMENTS: 25 INDEXES TOTAL SIZE: 36KB
Find Indexes Schema Anti-Patterns Aggregation Search Indexes
Generate queries from natural language in Compass
INSERT DOCUMENT
Filter Type a query: { field: 'value' }
Reset Apply Options
PREVIOUS
1-20 of many results
NEXT
Overview
DATABASE
Clusters
SERVICES
Atlas Search
Stream Processing
Triggers
Migration
Data Federation
SECURITY
Quickstart
Backup
Database Access
Network Access
Advanced
Goto
Search Namespaces
peerDB
comments
course
courses
meetings
notes
posts
students

Conclusion

This research aims to address the academic challenges faced by Software Engineering students at UTAS Nizwa by identifying gaps in peer learning support and academic resources. It focuses on developing a student-centric platform that promotes collaboration, resource sharing, and personalized academic assistance. The study used interviews to gather valuable insights into students' experiences and needs, employing a convenience sampling method to collect data. The analysis of both qualitative and quantitative data revealed recurring themes, such as the lack of accessible academic support, the need for flexible learning solutions, and the desire for peer-driven collaboration. By fostering a community-driven academic environment, offering 24/7 access to resources, and incorporating personalized tutoring options, this research aims to enhance the overall academic experience. The findings will contribute to creating a platform that empowers students to overcome learning challenges, improves engagement, and equips them with the skills needed to succeed in their academic journey.

References

(HILT), H. I. (2019). *Effective teaching strategies: Innovations in education*. Harvard University Press. Retrieved from https://hilt.harvard.edu/wp-content/uploads/2019/10/HILT-2019-HANDOUT-FORMATTED-4-PP.pdf

(IBO), I. B. (2020). DP Online Learning Literature Review. Retrieved from https://ibo.org/globalassets/new-structure/research/pdfs/dp-online-learning-literature-review.pdf

(NCBI), N. C. (2022). Mental health in online education: A systematic review. *PMC Journal*. doi:PMC9157034

Garrison, D. R. (2023). A framework for the community of inquiry: Online learning and teaching strategies. *Online Learning Journa, 28(2),* (1-24). doi: 10.24059/olj.v28i2.3954

Issa, A. (2024). : Systematic literature review of online academic student support in higher education. Retrieved from https://www.researchgate.net/publication/381121446_systematic_literature_review_of_online_academic_student_support_in_higher_education

Johnson, M. (2023). Effectiveness of practices and applications of student-centered teaching and learning in primary schools: A systematic literature review. Retrieved from https://www.researchgate.net/publication/381753909_Effectiveness_of_Practices_and_Applications_of_Student-Centered_Teaching_and_Learning_in_Primary_Schools_A_Systematic_Literature_Review

Quest, C. (2023). The 5 golden rules of client communication. *SpringerOpen Journal of Learning Support and Education*. doi:10.1186/s40561-023-00280-8

Research, Q. (2023). Exploring online education practices: A comprehensive study. Retrieved from https://eprints.qut.edu.au/69161/1/69161.pdf

Research, V. U. (2023). Systematic review of digital education methods: A holistic approach. Retrieved from https://vuir.vu.edu.au/48905/1/A%2BSystematic%2BLiterature%2BReview%2B.pdf

University, P. S. (2022). Online learning: The impact of digital education on student learning outcomes. Retrieved from https://pdxscholar.library.pdx.edu/cgi/viewcontent.cgi?article=7511&context=open_access_etds