**Peer-to-Peer Tutorial System for BISU Students**

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A Thesis Presented to the

College of Computing and Information Sciences

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**CHAPTER 1**

**THE PROBLEM AND ITS SCOPE**

**INTRODUCTION**

**Rationale**

Technology has greatly changed the way people live, communicate, and learn. With the rise of the internet and mobile devices, access to information and educational tools has become easier than ever before. Online learning platforms, mobile apps, and digital resources now play a big role in how students study and interact with their lessons. These tools help make learning more flexible and accessible, especially for students who face challenges with time, distance, or learning pace.

This study focuses on developing a **Peer-to-Peer Tutoring System** for Bohol Island State University – Balilihan Campus. The idea behind this system is simple but powerful: students helping fellow students. Peer tutoring allows learners to connect with classmates who understand certain subjects better and are willing to help. Instead of relying only on teachers or outside tutors, this system encourages students to support each other using a friendly and easy-to-use platform.

However, many students still struggle in a traditional classroom setting. Not all learners can keep up with the lessons, and not all can afford private tutors or attend scheduled group tutorials. Some students also feel shy or embarrassed to ask questions in class. These issues create learning gaps that can affect their performance and confidence. The lack of flexible and accessible tutoring options often leaves students without the support they need when they need it most.

To address these problems, the proposed system will serve as a platform where students can register either as a tutor or a learner. The system will help match them based on subjects and availability, making it easy to book sessions, communicate, and share learning materials. It is designed to be simple, free, and user-friendly so that students can focus on learning instead of struggling with the technology. It also includes a reward system to motivate tutors and features like messaging, feedback, and progress tracking.

In conclusion, this peer-to-peer tutoring system offers a modern solution to a common problem in education. It uses technology not just for convenience but to build a strong culture of teamwork and support among students. By allowing students to help each other, the system promotes academic success, confidence, and collaboration—key values that align with the goals of Bohol Island State University – Balilihan Campus.

**Literature Background**

Peer-to-peer tutoring has been the subject of many academic discussions, especially for its positive effects on students’ academic performance, communication skills, and confidence. According to Rizvi (2012), peer tutoring enhances both cognitive and communication abilities, as students actively participate in knowledge sharing. This interactive setup allows both tutors and tutees to benefit from the process.

Ali, Anwer, and Jaffar (2015) found that learners involved in peer tutoring sessions demonstrated better comprehension and classroom participation compared to those in traditional lecture-based learning. Their study emphasizes the value of engaging students through meaningful interaction.

Chin et al. (2011) also stressed the importance of peer tutoring in creating a cooperative learning environment. Their findings showed that tutoring enhances understanding through collaboration and allows tutors to reinforce their own learning while helping others.

Abdelkarim and Abuiyada (2016) highlighted that consistent peer tutoring sessions significantly improved students’ academic performance in both mathematics and English. This supports the use of peer-led tutoring as an effective supplementary learning method.

Furthermore, Haider and Yasmin (2015) reported that student tutors gained confidence, improved their leadership and communication skills, and became more self-directed in their studies. These benefits suggest that peer tutoring is not only effective academically but also supports holistic student development.

This study is grounded in **Lev Vygotsky’s Zone of Proximal Development (ZPD),** which emphasizes that learners achieve better outcomes when guided by someone more capable. According to Shabani, Khatib, and Ebadi (2010), the ZPD represents the difference between what a learner can do alone and what they can do with help. This theory aligns well with the peer-to-peer tutoring approach, where tutors act as learning partners rather than formal instructors. The social nature of learning, as emphasized by Vygotsky, is a key element in peer tutoring, allowing students to develop understanding through guided interaction and discussion.

Several recent studies support the implementation of peer tutoring, particularly within online or blended learning environments. Tang et al. (2020) explored the impact of peer support during the COVID-19 pandemic and found that it enhanced student motivation, engagement, and academic performance. Their study supports the value of peer-to-peer learning as an adaptable solution in times of educational disruption.

Joshi et al. (2020) analyzed how digital tools in peer tutoring increase learner engagement, especially in flexible and self-paced educational settings. Their findings suggest that online peer tutoring provides personalized support that complements formal instruction.

Ratilainen (2013) studied the social benefits of peer tutoring and concluded that it reduces academic stress and feelings of isolation among students. This is especially useful in universities where students often feel disconnected, particularly in their early years

Pallof and Pratt (2013) emphasized that online peer interactions promote group belonging and academic success. Their work shows that students are more likely to succeed when they feel part of a learning community.

Keystone (2021) reported that over 11,000 online institutions have adopted peer-assisted learning strategies, further demonstrating the growing trust in this educational model.

|  |
| --- |
| **Lev Vygotsky’s Zone of Proximal Development** |

**OUTPUT**

* Functional peer-to-peer tutoring system.
* Improved academic support and performance.
* Increased peer collaboration and student engagement.
* Recorded data for monitoring and evaluation.

**PROCESS**

* Registration of users as either tutor or learner.
* Matching of tutor and learner based on subject and availability.
* Booking of tutoring sessions.
* Messaging and file sharing.
* Feedback and progress tracking.

**INPUT**

* Identified academic difficulties among students.
* List of subjects and available tutors.
* Student schedules and preferences

**FIGURE 1: THEORETICAL AND CONCEPTUAL FRAMEWORK**

The development and implementation of a peer-to-peer tutoring system in this study are supported by several legal frameworks and educational policies in the Philippines and beyond:

**Republic Act No. 10929 (Free Internet Access in Public Places Act)** – This law promotes internet access in public schools and universities, supporting the use of online systems like the one proposed in this study.

**Republic Act No. 10533 (Enhanced Basic Education Act of 2013)** – This law encourages flexible, student-centered learning approaches, which includes the use of peer tutoring to improve academic outcomes.

**Commission on Higher Education (CHED) Memorandum Orders** – These guidelines promote learner support programs and innovative methods in higher education, including collaborative and technology-aided learning practices.

**Data Privacy Act of 2012 (Republic Act No. 10173)** – This law ensures that personal data collected in online platforms is handled securely. The proposed system complies with this law by protecting student data and ensuring user privacy.

**UNESCO Education 2030 Framework for Action** – This international framework calls for inclusive, equitable, and quality education, encouraging digital innovation and peer-based learning systems to support lifelong learning for all.

These laws and frameworks validate the development of a peer-to-peer tutoring system as a relevant and lawful approach to enhancing academic support at Bohol Island State University – Balilihan Campus.

**THE PROBLEM**

**Statement of the Problem**

Many Bohol Island State University – Balilihan Campus students struggle to keep up with their lessons due to the limitations of traditional classroom learning. Not all students learn at the same pace, and access to private or scheduled tutoring is often limited by time, cost, or availability. A peer-to-peer tutoring system could provide a more flexible and student-friendly solution by allowing learners to get help from fellow students who understand the subject well. With the use of technology, this system can make tutoring more accessible and convenient for everyone involved. This study seeks to answer the following questions:

1. What are the common learning difficulties faced by Bohol Island State University – Balilihan Campus students in a traditional classroom setting?
2. How can a peer-to-peer tutoring system improve access to academic support and enhance student learning?
3. What system features are needed to effectively connect tutors and learners based on subject and availability?

**Scope and Limitations**

This study is focused only on the students of Bohol Island State University – Balilihan Campus. The peer-to-peer tutoring system will be designed for use within this campus and will cover major subjects offered in the Balilihan campus. The system will allow students to sign up as either a tutor or a learner, match with available tutors based on subject and schedule, book and manage sessions, send messages, share learning files, and give feedback after each session.

However, this study has a few limitations. It does not include any payment or financial transactions. It is only for Bohol Island State University – Balilihan Campus students and does not cover students from other Bohol Island State University campuses or other schools. Also, some students may have difficulty using the system if they have slow internet or do not have access to a device. The system will focus only on basic features and will not include advanced tools like video calls or automatic grading. Despite these limits, the system aims to help Bohol Island State University – Balilihan Campus students support each other in learning through a simple and easy-to-use platform.

**Objectives of the Study**

The main goal of this study is to develop a peer-to-peer tutoring system for Bohol Island State University – Balilihan Campus that will help students support each other in their academic learning. Specifically, this study aims to:

* Create a system where students can register as tutors or learners.
* Match learners with available tutors based on subject and schedule.
* Allow users to book, manage tutoring sessions.
* Provide chat and file-sharing features for communication.
* Include feedback, rating, and progress tracking after each session.
* Encourage teamwork and support among students.
* Include a point-based reward system for active tutors.
* Make academic help easier to access for all BISU students

**Significance of the Study**

This study is important because it offers a practical solution to help Bohol Island State University – Balilihan Campus students improve their learning through a peer-to-peer tutoring system. The system is designed to be user-friendly, free, and accessible. It creates a supportive learning environment where students can help each other succeed. The benefits of this system extend to several groups:

**Students**. This system provides students with an easy and cost-free way to get help in subjects they find difficult. It allows them to choose their own schedule, learn at their own pace, and ask questions without fear of judgment. It also encourages collaboration and peer learning, which can boost their confidence and academic performance.

**Tutors (Student Helpers)**. Student tutors can improve their understanding of the subjects they teach while also gaining experience in communication, leadership, and teaching. This can help them build skills that are valuable in both academic and real-world settings.

**Teachers.** Teachers can use the system as additional academic support for their students. With the help of peer tutors, students who struggle in class can still catch up and perform better. This also helps teachers focus more on students who need extra attention during classroom sessions.

**Bohol Island State University- Balilihan Campus.** By adopting this system, Bohol Island State University – Balilihan Campus shows its commitment to student-centered and technology-driven learning. It provides a sustainable way to support students without requiring large budgets, while also promoting a culture of collaboration and shared learning.

**Future Researchers.** This study can serve as a reference for future researchers who wish to improve or create similar peer tutoring systems. It also opens up new possibilities for using digital platforms to enhance education in other schools or institutions.

**RESEARCH METHODOLOGY**

**Research Design**

This study uses a developmental research design. It focuses on designing, building, and testing a peer-to-peer tutoring system for Bohol Island State University – Balilihan Campus. The goal is to provide an online system that helps students connect and support each other in learning.

**Research Environment**

This study was conducted at **Bohol Island State University – Balilihan Campus**, specifically within the College of Computer Studies where students taking Bachelor of Science in Information Systems (BSIS) are enrolled. The university is located in a rural area and serves students from various nearby municipalities. The research environment includes classrooms, computer laboratories, and common areas where students commonly collaborate on academic tasks. The chosen setting is ideal for the study since the peer-to-peer tutorial system being developed is designed to support students academically by enabling tutorial sessions facilitated by fellow students.

The environment is equipped with basic computing infrastructure, including i3 laptops used by most students and internet access within the campus premises. These facilities are crucial for the development, deployment, and testing of the proposed system. Furthermore, the presence of technology-literate students and faculty members provided an opportunity for effective observation and data gathering.

**Research Participants**

The participants of this study include selected students from the CCIS, Criminology, and CTAS departments. Participants were identified based on their involvement in academic peer interactions, either as students seeking academic assistance or those capable of providing tutoring support.

This selection ensured representation from various fields of study, allowing the system to address different academic needs. The diverse academic backgrounds of participants provided valuable insights into the varying nature of tutoring demands across departments.

**Data Gathering Instrument**

The primary data gathering method used in this study was **structured observation.** This technique involved directly observing students' academic interactions within campus to gain insights into existing peer-to-peer support practices. Observations were conducted in common study areas such as computer laboratories, hallways, and open study spaces where students frequently collaborate. The researchers focused on identifying the subjects in which students typically seek assistance, the informal methods they use for tutoring, such as personal meetups or messaging platforms, and the challenges they face in finding suitable peers for academic help.

**Development Model**

The **System Development Life Cycle (SDLC)** using the **Agile model** was adopted for the system's implementation. Agile methodology allowed for flexibility, rapid iteration, and adaptability, which was suitable for a project where continuous observation and user behavior analysis informed design decisions. The iterative nature of Agile facilitated the implementation of changes based on real-time observations of how students interacted with the system.

**Research Procedure**

The researchers followed the **System Development Life Cycle (SDLC)** approach, using the **Agile model** to guide the implementation of the peer-to-peer tutoring system. This approach allowed for flexibility, collaboration, and rapid iteration, enabling the researchers to respond to the changing needs of students and faculty. By employing the SDLC framework, the researchers ensured that the system was thoroughly planned, executed, and evaluated, leading to the development of a reliable and efficient peer tutoring platform intended to support the academic needs of the BISU student body.

**Phase I: Preliminary Observation and Needs Assessment**

This initial phase focused on gathering data through direct observation of students’ academic behaviors, interactions in study groups, and their engagement with current tutoring or peer support systems. The researchers conducted informal observations and interactions with students to identify common academic challenges, preferred methods of seeking help, and any existing gaps in peer tutoring. The goal of this phase was to assess the needs of students and determine their readiness to engage in a peer-to-peer tutoring system.

**Phase II: System Design and Planning**

In this phase, the researchers conceptualized the design of the peer-to-peer tutoring system, including defining the core functionalities and features. The system design focused on facilitating seamless communication between students, creating an easy-to-use platform for peer tutoring, and integrating features to support both tutors and learners. This phase ensured that the system would align with the identified needs and provide an effective platform for peer-to-peer academic support.

**Phase III: Pilot Testing and Observation**

A selected group of students participated in a controlled trial of the peer-to-peer tutoring system. The researchers observed how students interacted with the system, paying close attention to its usability, effectiveness, and areas for improvement. This phase allowed the team to gather firsthand data on user experiences and identify any technical or operational issues that needed to be addressed prior to wider deployment.

**Phase IV: Data Evaluation and Refinement**

Following the pilot testing phase, the researchers evaluated the data gathered from observations to identify recurring issues and areas for system improvement. Based on these findings, adjustments were made to enhance the system’s interface, user navigation, and overall functionality. The goal was to ensure that the system becomes more intuitive and responsive to the academic needs of students as revealed through real-world usage.

**Phase V: Pre-Launch Observation and Preparation**

This phase is currently ongoing. The system has not yet been officially launched campus-wide. Instead, it remains in a controlled pre-launch state where further refinements are being made based on additional rounds of observation and limited user access. The researchers continue to monitor the system closely, address technical issues, and ensure system readiness. Full deployment will commence once the system meets the required standards of reliability, usability, and academic relevance.

**Phase VI: Ongoing Monitoring and Evaluation (In Progress)**

This final phase is also ongoing. While the system is not yet fully deployed, preparations for long-term monitoring are underway. The researchers are actively observing system performance and user engagement during the pre-launch phase. Plans are in place for continuous evaluation after launch, including regular system maintenance, feature enhancements, and adjustments based on future observations. This ensures the system remains effective and sustainable as a peer tutoring solution for BISU students.

**System Development Tools and Technologies**

This study used different tools to build the peer-to-peer tutoring system. Each tool has its own purpose in the development of the system.

**Java Spring Boot – Backend**. Java Spring Boot was used for the backend of the system. It handles the main processes such as saving data, matching tutors and learners, booking sessions, and managing users. It is a reliable tool for creating strong and secure systems.

**MySQL – Database**. MySQL was used as the database. It stores all the information in the system such as user details, subjects, schedules, messages, and feedback. It helps keep the data organized and easy to access.

**React JS with CSS – Frontend.** React JS was used to build the frontend or the part of the system that users see. It allows the system to respond quickly and run smoothly. CSS was used to design the pages and make the system look clean and easy to use.

**Target Users**. The system is made for Bohol Island State University – Balilihan Campus students only. These include:

* **Tutors** – Students who are skilled in certain subjects and want to help others.
* **Learners** – Students who need help understanding their lessons and want to learn from their peers.

1.Login

2.Register

if choice==1

if choice==2

A

Login

Input Login Credentials

if role==Admin

if

credentials==true

if role==Student

Student Dashboard

T

T

if role==Tutor

Admin Dashboard

Tutor Dashboard

T

**FIGURE 2: FLOWCHART LOGIN**

**FIGURE 3: FLOWCHART REGISTER**

A

if password != repeat password

Password do not match

Use BISU email

Input Username

Input Email

Input Password

Input Recent Password

if email != bisu.edu.ph

if correct

if choice==2

1.Profile

2.Sessions

3.Leaderboard

4.Student’s List

5.Logout

C

Display Profile

1.Edit

Successfully edited

Input details

if choice==1

if choice==5

if choice==4

if choice==3

if choice==1

Tutor

Dashboard

if choice==2

**FIGURE 5: FLOWCHART TUTOR DASHBOARD**

if yes

Deleted Successfully

N

N

if choice==3

Are you sure you want to delete?

if choice==1

Success

1.Input names

2.Input grade

Rejected Successfully

Approved Successfully

Display Students

1.Student

2.Grades

Display Leaderboard

1.Approve

2.Reject

3.Delete

if choice==1

if choice==4

if choice==3

if choice==2

Admin Dashboard

**FIGURE 6: FLOWCHART ADMIN DASHBOARD**

N

Successfully Declined

if choice==2

Display Sessions

Successfully Approved

if choice==1

1.Approve

2.Decline

Display Users

D

1.Sessions

2.Tutor Request

3.Users

4.Logout

1.Profile

2.Tutor List

3.Session

4.Message

5.Logout

Student Dashboard

B

1.Back

Display Messages

1.Back

Display Session

Display Profile

1.Edit

Successfully edited

Input details

if d.choice==1

if choice==2

if choice==5

if choice==4

if choice==3

if choice==1

**FIGURE 4: FLOWCHART STUDENT DASHBOARD**

N

Okay

Applied Successfully

if yes

Display Confirmation

if d.choice==1

1.Apply Session

2.Apply as tutor

**Definition of Terms**

* **Booking System** – A feature in the system that allows users to set, manage, or cancel tutoring appointments.
* **File Sharing** – A feature that allows users to send documents, notes, or learning materials during or before tutoring sessions.
* **Learner** – A student who seeks help from a peer tutor to better understand a subject.
* **Messaging Feature** – A tool that lets tutors and learners send messages and communicate inside the system.
* **Peer-to-Peer Tutoring** – A method where students help each other learn by sharing knowledge and skills, usually with one student acting as the tutor and another as the learner.
* **Point System** – A rewards feature where tutors earn points for every completed session, which may reflect their activity or performance.
* **Progress Tracking** – A feature that records and shows the learner’s improvement over time.
* **Rating and Review** – A system where learners can give feedback on the tutor’s performance after each session.
* **Tutor** – A student who volunteers or applies to teach or assist other students in subjects they are good at.
* **Tutoring Session** – A scheduled meeting between a tutor and a learner, either online or in person, where learning takes place.
* **User-Friendly** – Easy to use and understand, even for first-time users.

**Chapter 2**

**PRESENTATION OF THE PRESENT AND PROPOSED SYSTEM**

1. **PRESENT SYSTEM**

**System Narrative**

Currently, Bohol Island State University – Balilihan Campus lacks a formal and centralized system to manage peer-to-peer tutoring. Students who require academic assistance often rely on informal arrangements with classmates or friends, typically through direct communication or word of mouth. While certain student organizations or faculty may occasionally facilitate tutoring sessions, these efforts are irregular and lack a standardized approach to scheduling, documentation, and feedback.

This lack of a structured system results in missed opportunities for both students needing help and those capable of offering it. There is no formal process for tracking tutoring sessions or evaluating their effectiveness, which diminishes the overall quality of academic support available. Furthermore, students often struggle to find tutors, and tutors do not have a platform to offer their services systematically. The absence of an organized, efficient tutoring system limits the academic growth of students and reduces the potential for peer collaboration.

**Findings and Constraints**

The present system for academic support at Bohol Island State University is informal and unorganized. Students usually rely on classmates or friends when they need tutoring, often using personal messages or verbal communication. Because there is no centralized platform, it becomes difficult for students to find the right tutor for specific subjects. On the other hand, students who are capable of tutoring have no proper way to offer their help. This leads to missed opportunities for both learners and potential tutors.

Another issue is the lack of a system to record or monitor tutoring sessions. Without proper tracking, it is hard to know if the sessions are effective or helpful. Tutors also do not receive feedback from students, so they cannot improve their teaching methods. In addition, tutors are not given any formal recognition for their efforts, which may affect their willingness to continue offering help. All of these gaps reduce the effectiveness of peer-to-peer tutoring in the university.

There are several specific limitations in the current setup that affect the efficiency and effectiveness of peer-to-peer tutoring. These include the following:

1. All tutoring sessions are arranged manually, which often causes delays or confusion when setting schedules.
2. There is no standard way to evaluate the quality or success of a tutoring session, making it difficult to measure student improvement.
3. It is hard to match students and tutors due to the lack of a system for checking availability.
4. Storing and organizing information about students, tutors, and sessions is difficult because there is no formal database or digital record-keeping system.

**B. THE PROPOSED SYSTEM**

**System Rules**

The proposed Peer-to-Peer Tutoring System aims to resolve the limitations identified in the current system by providing a digital platform that facilitates organized, transparent, and efficient peer tutoring. The system is designed to enable students to request academic assistance from their peers and for qualified students to offer tutoring services. The system introduces several key features, including user role management, tutor eligibility, session scheduling, and feedback mechanisms, which collectively enhance the overall learning experience.

**1. User Roles and Registration**

* All users must register an account, providing a unique email and username. Upon registration, users are assigned roles, which include "Student," "Tutor," and "Admin."
* Students who meet the academic criteria may apply to become tutors. Admin users are responsible for managing user accounts and approving tutor applications.

**2. Tutor Eligibility and Approval**

* Students wishing to become tutors must submit their General Weighted Average (GWA) and select the subjects they wish to tutor.
* Tutors must have a good academic standing in the subjects they choose to tutor and provide relevant documentation, such as their grades.
* Admin users will review and approve or reject tutor applications based on eligibility criteria.

**3. Subject and Department Assignment**

* Each student is assigned to a specific department, which dictates the subjects they can request tutoring for.
* Tutors are also linked to their respective departments and may tutor subjects within their expertise.
* The system ensures that students can only request tutoring for subjects that align with their department and academic program.

**4. Session Management**

* Students can browse available tutors based on the subjects they need help with.
* After selecting a tutor, students can request a session. Tutors will receive the session request and have the option to accept or decline it.
* Once accepted, a tutoring session is created, and both the tutor and student can track the status of the session (e.g., pending, ongoing, completed, or canceled).

**5. Messaging System**

* A built-in messaging system allows tutors and students to communicate directly during tutoring sessions.
* All messages are timestamped and recorded within the system for future reference.

**6. Ratings and Feedback**

* Upon completion of a session, students are asked to rate their tutor based on their experience.
* Ratings are stored in the system and can be accessed by other students to help them select qualified tutors.
* The feedback system promotes accountability and ensures continuous improvement in tutoring services.

**7. Administrator Control**

* Admin users have full access to all system data, including user profiles, tutor applications, sessions, and ratings.
* Admins are responsible for overseeing the operation of the system, resolving disputes, and ensuring the quality and integrity of the tutoring services provided.

**Process Specification**

1. Login to the Peer-to-Peer Tutorial System

Begin

* Enter Username
* Enter Password
* If credentials match with registered user
  + Grant Access to the System based on user role (Student or Tutor)
* Else
  + Display “Invalid credentials, please try again”  
    End

2. Dashboard

Begin

* Display Total Students
* Display Total Tutors
* Display Total Subjects
* Display Total Sessions
* Display Ratings Overview  
  End

3. Student Management

If Add Student

* Input student profile (Name, Year Level, Department, etc.)
* Link to existing User account
* Submit form  
  End

If View Students

* Search Request
* Filter Display by Year Level or Department
* View Full Profile  
  Else
* Update Student Information  
  End

4. Tutor Management

If Add Tutor

* Input Tutor Information (Student ID, GWA, Availability)
* Select Subjects to Teach
* Submit Form  
  End

If View Tutor

* Search Request
* Filter by Subject or Department
* View Profile  
  Else
* Update Tutor Availability or Assigned Subjects  
  End

5. Subject Management

If Add Subject

* Input Subject Name
* Submit  
  End

If View Subject List

* Display Subject Table
* Filter by Department
* View Details  
  End

6. Session Management

If Create New Session Request

* Select Tutor
* Select Subject
* Submit Request  
  End

If View Session History

* Display Session List (Past and Pending Sessions)
* Filter by Subject or Status  
  Else
* Update Session Status (e.g., Completed, Cancelled)  
  End

7. Messaging System

If Open Session Chat

* Load Session Message Thread
* Input Message
* Send Message  
  End

If View Messages

* Search or Filter by Session or Date
* View Conversation  
  End

8. Rating System

If Rate a Tutor

* Select Session
* Choose Star Rating (1 to 5)
* Submit Feedback  
  End

If View Ratings

* Display Average Rating per Tutor
* Filter by Subject or Department  
  End

9. Department Management

If Add Department

* Input Department Name
* Submit  
  End

If View Departments

* Display All Departments
* Filter or Search
* Update Department Name  
  End

10. User Management

If Add User

* Input Username, Email, Password, and Role
* Submit  
  End

If Reset Password

* Input Email or Username
* System Sends Reset Token
* Update Password  
  End

If View User List

* Search Request
* Filter by Role
* Edit or Delete User  
  End

**Database Design**

The following tables outline the database structure for the Peer-to-Peer Tutorial System. These tables ensure accurate data storage, consistency, and seamless interaction among users, tutors, subjects, and sessions within the system.

Table 1. **User**. This table holds basic authentication and account data for all users in the system.

|  |  |  |
| --- | --- | --- |
| **Field Name** | **Data Type** | **Description** |
| user\_id | int | |  | | --- | | A unique identifier for each user (Primary Key). |  |  | | --- | |  | |
| username | varchar | |  | | --- | | A unique identifier for each user (Primary Key). |  |  | | --- | |  | |
| email | varchar | |  | | --- | | The user's email address. |  |  | | --- | |  | |
| salt | varchar | |  | | --- | | A random string used for password hashing. |  |  | | --- | |  | |
| hash\_password | varchar | |  | | --- | | The hashed password for secure authentication. |  |  | | --- | |  | |
| role | varchar | |  | | --- | | Specifies the role (e.g., student, tutor, admin). |  |  | | --- | |  | |
| created\_At | varchar | |  | | --- | | Specifies the role (e.g., student, tutor, admin). |  |  | | --- | |  | |

Table 2. **Student**. Contains additional student-specific details and links to the user's account and department.

|  |  |  |
| --- | --- | --- |
| **Field Name** | **Data Type** | **Description** |
| student\_id | int | |  | | --- | | A unique identifier for each student (Primary Key). |  |  | | --- | |  | |
| user\_id | int | |  | | --- | | Foreign Key referencing user\_id in the User table. |  |  | | --- | |  | |
| first\_name | varchar | |  | | --- | | The student’s first name. |  |  | | --- | |  | |
| middle\_name | varchar | The student’s middle name.   |  | | --- | |  |  |  | | --- | |  | |
| last\_name | varchar | |  | | --- | | The student’s last name. |  |  | | --- | |  | |
| year\_level | varchar | |  | | --- | | The student’s year level (e.g., 1st Year, 2nd Year). |  |  | | --- | |  | |
| department\_id | int | Foreign Key referencing department\_id in the Department table |

Table 3. **Department**. Stores information about academic departments.

|  |  |  |
| --- | --- | --- |
| **Field Name** | **Data Type** | **Description** |
| department\_id | int | A unique identifier for each department (Primary Key).   |  | | --- | |  | |
| department\_name | varchar | The name of the department. |

|  |
| --- |
|  |

Table 4. **Tutor**. Links a student account to a tutor profile and stores tutor-specific data.

|  |  |  |
| --- | --- | --- |
| **Field Name** | **Data Type** | **Description** |
| tutor\_id | int | |  | | --- | | A unique identifier for each tutor (Primary Key). |  |  | | --- | |  | |
| student\_id | int | |  | | --- | | Foreign Key referencing student\_id in the Student table. |  |  | | --- | |  | |
| user\_id | int | |  | | --- | | Foreign Key referencing user\_id in the User table. |  |  | | --- | |  | |
| gwa | decimal | |  | | --- | | Foreign Key referencing user\_id in the User table. |  |  | | --- | |  | |
| availability | varchar | The tutor’s available times or schedule.   |  | | --- | |  |  |  | | --- | |  | |
| created\_at | timestamp | Timestamp when the tutor was added to the system. |

Table 5. **Subject**.Represents different academic subjects available for tutoring.

|  |  |  |
| --- | --- | --- |
| **Field Name** | **Data Type** | **Description** |
| subject\_id | int | |  | | --- | | A unique identifier for each subject (Primary Key). |  |  | | --- | |  | |
| subject\_name | varchar | The name of the subject. |

Table 6. **Tutor\_Subject.** Creates a many-to-many relationship between tutors and the subjects they can teach.

|  |  |  |
| --- | --- | --- |
| **Field Name** | **Data Type** | **Description** |
| tutor\_id | int | |  | | --- | | Foreign Key referencing tutor\_id in the Tutor table. |  |  | | --- | |  | |
| subject\_id | int | |  | | --- | | Foreign Key referencing subject\_id in the Subject table. |  |  | | --- | |  | |
| grade | varchar | Grade received in the subject, used to verify expertise. |

Table 7. **Session**. Stores data about tutoring sessions, including status and involved parties.

|  |  |  |
| --- | --- | --- |
| **Field Name** | **Data Type** | **Description** |
| session\_id | int | A unique identifier for each session (Primary Key).   |  | | --- | |  | |
| student\_id | int | |  | | --- | | Foreign Key referencing student\_id in the student table. |  |  | | --- | |  | |
| tutor\_id | int | |  | | --- | | Foreign Key referencing tutor\_id in the Tutor table. |  |  | | --- | |  | |
| subject\_id | int | |  | | --- | | Foreign Key referencing subject\_id in the Subject table. |  |  | | --- | |  | |
| status | varchar | |  | | --- | | The current status of the session (e.g., pending, completed). |  |  | | --- | |  | |
| created\_At | timestamp | Timestamp when the session was created. |

Table 8. **Messages**. Enables communication between students and tutors within a session.

|  |  |  |
| --- | --- | --- |
| **Attributes Name** | **Primary Key** | **Foreign Key** |
| session\_id | int | |  | | --- | | Foreign Key referencing session\_id in the Session table. |  |  | | --- | |  | |
| sender\_id | int | |  | | --- | | Foreign Key referencing user\_id of the sender. |  |  | | --- | |  | |
| message | text | |  | | --- | | The content of the message. |  |  | | --- | |  | |
| reciever\_id | int | |  | | --- | | Foreign Key referencing user\_id of the receiver. |  |  | | --- | |  | |
| send\_At | timestamp | Timestamp of when the message was sent. |

Table 9. **Rates**. Stores student feedback in the form of ratings for tutors.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  | | --- | | **Field Name** |  |  | | --- | |  | | |  | | --- | | **Data Type** |  |  | | --- | |  | | | **Description** | | --- |  |  | | --- | |  | |
| rate\_id | int | |  | | --- | | A unique identifier for each rating record (Primary Key). |  |  | | --- | |  | |
| student\_id | int | |  | | --- | | Foreign Key referencing student\_id in the Student table. |  |  | | --- | |  | |
| tutor\_id | int | |  | | --- | | Foreign Key referencing tutor\_id in the Tutor table. |  |  | | --- | |  | |
| rate | int | The rating given by the student (e.g., 1 to 5 stars). |

**Technical Requirements**

The Peer-to-Peer Tutorial System for BISU Students requires the integration of various components, including hardware, software, operating systems, and peopleware, to function effectively. These elements must work together to support the platform’s full functionality. With its solid design and reliable architecture, the system aims to provide a long-term, maintainable, and accessible tutorial platform for BISU students.

**Hardware Requirements**

Hardware refers to the physical components necessary to run and maintain the system. The following are the minimum hardware requirements to ensure smooth performance, particularly for system hosting and end-user access:

**Server/Developer Machine:**

Microprocessor: Minimum requirement: Intel Core i5 or AMD Ryzen 5, 2GHz or higher

RAM: Minimum requirement: 8GB

Hard Disk Drive / SSD: Minimum requirement: 512GB storage (SSD preferred for faster data access)

Display Monitor, Mouse, and Keyboard

**End-User Device (Student/Tutor):**

Any smartphone, tablet, laptop, or desktop capable of running a modern web browser such as Google Chrome or Firefox.

**Software Requirements**

Software includes all programs and tools used to develop, run, and maintain the Peer-to-Peer Tutorial System. The system relies on the following technologies:

**Backend Application:**

Java Spring Boot – This framework handles all backend logic such as data processing, session handling, user management, and system security. It is known for its strong architecture and scalability.

**Frontend Application:**

React JS – A powerful frontend JavaScript library that creates responsive and dynamic interfaces for users the students and tutors.  
CSS – Used for designing and styling the platform to ensure a clean and user-friendly experience.

**Database:**

MySQL – Stores structured data such as user accounts, subjects, tutorial session details, chat messages, and ratings. It is reliable, fast, and ideal for handling academic records and tutorial transactions.

**Operating System**

The system runs on a variety of operating systems, depending on the environment:

* Development Environment: Windows 10 or higher / Ubuntu Linux / macOS
* Server Deployment: Ubuntu Server (preferred) or any modern Linux-based system for hosting Java-based applications
* Client Side: The platform is browser-based, requiring only a modern web browser on any OS (Windows, Android, iOS, Linux)

**Peopleware**

Peopleware refers to the individuals involved in using, managing, and maintaining the system. For the Peer-to-Peer Tutorial System, these include:

* Administrators – Handle tutor approvals, system settings, and account management
* Tutors – Provide academic help to fellow students based on subjects they are proficient in
* Students/Learners – Seek assistance on difficult subjects and book sessions
* Developers/Maintenance Team – Responsible for system updates, bug fixing, and performance monitoring

**Benefits**

The system introduces a more efficient and collaborative method for academic assistance within Bohol Island State University – Balilihan Campus. By enabling students to easily connect with peer tutors, the platform fosters learning, encourages communication, and improves academic performance. It reduces dependency on traditional methods like face-to-face consultations and paper-based scheduling.

**Tangible Benefits**

* Time and Cost Efficiency – Students can book tutorials online without going through manual processes.
* Streamlined Scheduling – Automatically manages sessions, avoiding scheduling conflicts.
* Improved Record Keeping – Stores session history, ratings, and tutor availability.
* Paperless Transactions – Reduces reliance on physical records and documents.

**Intangible Benefits**

* Enhanced Learning Experience – Students learn from peers in a more relaxed, relatable environment.
* Increased Engagement – Encourages student participation in both giving and receiving help.
* Community Building – Promotes cooperation and academic support among Bohol Island State University – Balilihan Campus students.
* Institutional Reputation – Positions Bohol Island State University – Balilihan Campus as a technologically forward and student-centered institution

**Chapter 2**

**PRESENTATION OF THE PRESENT AND PROPOSED SYSTEM**

1. **PRESENT SYSTEM**

**System Narrative**

Currently, Bohol Island State University – Balilihan Campus lacks a formal and centralized system to manage peer-to-peer tutoring. Students who require academic assistance often rely on informal arrangements with classmates or friends, typically through direct communication or word of mouth. While certain student organizations or faculty may occasionally facilitate tutoring sessions, these efforts are irregular and lack a standardized approach to scheduling, documentation, and feedback.

This lack of a structured system results in missed opportunities for both students needing help and those capable of offering it. There is no formal process for tracking tutoring sessions or evaluating their effectiveness, which diminishes the overall quality of academic support available. Furthermore, students often struggle to find tutors, and tutors do not have a platform to offer their services systematically. The absence of an organized, efficient tutoring system limits the academic growth of students and reduces the potential for peer collaboration.

**Findings and Constraints**

The present system for academic support at Bohol Island State University is informal and unorganized. Students usually rely on classmates or friends when they need tutoring, often using personal messages or verbal communication. Because there is no centralized platform, it becomes difficult for students to find the right tutor for specific subjects. On the other hand, students who are capable of tutoring have no proper way to offer their help. This leads to missed opportunities for both learners and potential tutors.

Another issue is the lack of a system to record or monitor tutoring sessions. Without proper tracking, it is hard to know if the sessions are effective or helpful. Tutors also do not receive feedback from students, so they cannot improve their teaching methods. In addition, tutors are not given any formal recognition for their efforts, which may affect their willingness to continue offering help. All of these gaps reduce the effectiveness of peer-to-peer tutoring in the university.

There are several specific limitations in the current setup that affect the efficiency and effectiveness of peer-to-peer tutoring. These include the following:

1. All tutoring sessions are arranged manually, which often causes delays or confusion when setting schedules.
2. There is no standard way to evaluate the quality or success of a tutoring session, making it difficult to measure student improvement.
3. It is hard to match students and tutors due to the lack of a system for checking availability.
4. Storing and organizing information about students, tutors, and sessions is difficult because there is no formal database or digital record-keeping system.

**B. THE PROPOSED SYSTEM**

**System Rules**

The proposed Peer-to-Peer Tutoring System aims to resolve the limitations identified in the current system by providing a digital platform that facilitates organized, transparent, and efficient peer tutoring. The system is designed to enable students to request academic assistance from their peers and for qualified students to offer tutoring services. The system introduces several key features, including user role management, tutor eligibility, session scheduling, and feedback mechanisms, which collectively enhance the overall learning experience.

**1. User Roles and Registration**

* All users must register an account, providing a unique email and username. Upon registration, users are assigned roles, which include "Student," "Tutor," and "Admin."
* Students who meet the academic criteria may apply to become tutors. Admin users are responsible for managing user accounts and approving tutor applications.

**2. Tutor Eligibility and Approval**

* Students wishing to become tutors must submit their General Weighted Average (GWA) and select the subjects they wish to tutor.
* Tutors must have a good academic standing in the subjects they choose to tutor and provide relevant documentation, such as their grades.
* Admin users will review and approve or reject tutor applications based on eligibility criteria.

**3. Subject and Department Assignment**

* Each student is assigned to a specific department, which dictates the subjects they can request tutoring for.
* Tutors are also linked to their respective departments and may tutor subjects within their expertise.
* The system ensures that students can only request tutoring for subjects that align with their department and academic program.

**4. Session Management**

* Students can browse available tutors based on the subjects they need help with.
* After selecting a tutor, students can request a session. Tutors will receive the session request and have the option to accept or decline it.
* Once accepted, a tutoring session is created, and both the tutor and student can track the status of the session (e.g., pending, ongoing, completed, or canceled).

**5. Messaging System**

* A built-in messaging system allows tutors and students to communicate directly during tutoring sessions.
* All messages are timestamped and recorded within the system for future reference.

**6. Ratings and Feedback**

* Upon completion of a session, students are asked to rate their tutor based on their experience.
* Ratings are stored in the system and can be accessed by other students to help them select qualified tutors.
* The feedback system promotes accountability and ensures continuous improvement in tutoring services.

**7. Administrator Control**

* Admin users have full access to all system data, including user profiles, tutor applications, sessions, and ratings.
* Admins are responsible for overseeing the operation of the system, resolving disputes, and ensuring the quality and integrity of the tutoring services provided.

**Process Specification**

1. Login to the Peer-to-Peer Tutorial System

Begin

* Enter Username
* Enter Password
* If credentials match with registered user
  + Grant Access to the System based on user role (Student or Tutor)
* Else
  + Display “Invalid credentials, please try again”  
    End

2. Dashboard

Begin

* Display Total Students
* Display Total Tutors
* Display Total Subjects
* Display Total Sessions
* Display Ratings Overview  
  End

3. Student Management

If Add Student

* Input student profile (Name, Year Level, Department, etc.)
* Link to existing User account
* Submit form  
  End

If View Students

* Search Request
* Filter Display by Year Level or Department
* View Full Profile  
  Else
* Update Student Information  
  End

4. Tutor Management

If Add Tutor

* Input Tutor Information (Student ID, GWA, Availability)
* Select Subjects to Teach
* Submit Form  
  End

If View Tutor

* Search Request
* Filter by Subject or Department
* View Profile  
  Else
* Update Tutor Availability or Assigned Subjects  
  End

5. Subject Management

If Add Subject

* Input Subject Name
* Submit  
  End

If View Subject List

* Display Subject Table
* Filter by Department
* View Details  
  End

6. Session Management

If Create New Session Request

* Select Tutor
* Select Subject
* Submit Request  
  End

If View Session History

* Display Session List (Past and Pending Sessions)
* Filter by Subject or Status  
  Else
* Update Session Status (e.g., Completed, Cancelled)  
  End

7. Messaging System

If Open Session Chat

* Load Session Message Thread
* Input Message
* Send Message  
  End

If View Messages

* Search or Filter by Session or Date
* View Conversation  
  End

8. Rating System

If Rate a Tutor

* Select Session
* Choose Star Rating (1 to 5)
* Submit Feedback  
  End

If View Ratings

* Display Average Rating per Tutor
* Filter by Subject or Department  
  End

9. Department Management

If Add Department

* Input Department Name
* Submit  
  End

If View Departments

* Display All Departments
* Filter or Search
* Update Department Name  
  End

10. User Management

If Add User

* Input Username, Email, Password, and Role
* Submit  
  End

If Reset Password

* Input Email or Username
* System Sends Reset Token
* Update Password  
  End

If View User List

* Search Request
* Filter by Role
* Edit or Delete User  
  End

**Database Design**

The following tables outline the database structure for the Peer-to-Peer Tutorial System. These tables ensure accurate data storage, consistency, and seamless interaction among users, tutors, subjects, and sessions within the system.

Table 1. **User**. This table holds basic authentication and account data for all users in the system.

|  |  |  |
| --- | --- | --- |
| **Field Name** | **Data Type** | **Description** |
| user\_id | int | |  | | --- | | A unique identifier for each user (Primary Key). |  |  | | --- | |  | |
| username | varchar | |  | | --- | | A unique identifier for each user (Primary Key). |  |  | | --- | |  | |
| email | varchar | |  | | --- | | The user's email address. |  |  | | --- | |  | |
| salt | varchar | |  | | --- | | A random string used for password hashing. |  |  | | --- | |  | |
| hash\_password | varchar | |  | | --- | | The hashed password for secure authentication. |  |  | | --- | |  | |
| role | varchar | |  | | --- | | Specifies the role (e.g., student, tutor, admin). |  |  | | --- | |  | |
| created\_At | varchar | |  | | --- | | Specifies the role (e.g., student, tutor, admin). |  |  | | --- | |  | |

Table 2. **Student**. Contains additional student-specific details and links to the user's account and department.

|  |  |  |
| --- | --- | --- |
| **Field Name** | **Data Type** | **Description** |
| student\_id | int | |  | | --- | | A unique identifier for each student (Primary Key). |  |  | | --- | |  | |
| user\_id | int | |  | | --- | | Foreign Key referencing user\_id in the User table. |  |  | | --- | |  | |
| first\_name | varchar | |  | | --- | | The student’s first name. |  |  | | --- | |  | |
| middle\_name | varchar | The student’s middle name.   |  | | --- | |  |  |  | | --- | |  | |
| last\_name | varchar | |  | | --- | | The student’s last name. |  |  | | --- | |  | |
| year\_level | varchar | |  | | --- | | The student’s year level (e.g., 1st Year, 2nd Year). |  |  | | --- | |  | |
| department\_id | int | Foreign Key referencing department\_id in the Department table |

Table 3. **Department**. Stores information about academic departments.

|  |  |  |
| --- | --- | --- |
| **Field Name** | **Data Type** | **Description** |
| department\_id | int | A unique identifier for each department (Primary Key).   |  | | --- | |  | |
| department\_name | varchar | The name of the department. |

|  |
| --- |
|  |

Table 4. **Tutor**. Links a student account to a tutor profile and stores tutor-specific data.

|  |  |  |
| --- | --- | --- |
| **Field Name** | **Data Type** | **Description** |
| tutor\_id | int | |  | | --- | | A unique identifier for each tutor (Primary Key). |  |  | | --- | |  | |
| student\_id | int | |  | | --- | | Foreign Key referencing student\_id in the Student table. |  |  | | --- | |  | |
| user\_id | int | |  | | --- | | Foreign Key referencing user\_id in the User table. |  |  | | --- | |  | |
| gwa | decimal | |  | | --- | | Foreign Key referencing user\_id in the User table. |  |  | | --- | |  | |
| availability | varchar | The tutor’s available times or schedule.   |  | | --- | |  |  |  | | --- | |  | |
| created\_at | timestamp | Timestamp when the tutor was added to the system. |

Table 5. **Subject**.Represents different academic subjects available for tutoring.

|  |  |  |
| --- | --- | --- |
| **Field Name** | **Data Type** | **Description** |
| subject\_id | int | |  | | --- | | A unique identifier for each subject (Primary Key). |  |  | | --- | |  | |
| subject\_name | varchar | The name of the subject. |

Table 6. **Tutor\_Subject.** Creates a many-to-many relationship between tutors and the subjects they can teach.

|  |  |  |
| --- | --- | --- |
| **Field Name** | **Data Type** | **Description** |
| tutor\_id | int | |  | | --- | | Foreign Key referencing tutor\_id in the Tutor table. |  |  | | --- | |  | |
| subject\_id | int | |  | | --- | | Foreign Key referencing subject\_id in the Subject table. |  |  | | --- | |  | |
| grade | varchar | Grade received in the subject, used to verify expertise. |

Table 7. **Session**. Stores data about tutoring sessions, including status and involved parties.

|  |  |  |
| --- | --- | --- |
| **Field Name** | **Data Type** | **Description** |
| session\_id | int | A unique identifier for each session (Primary Key).   |  | | --- | |  | |
| student\_id | int | |  | | --- | | Foreign Key referencing student\_id in the student table. |  |  | | --- | |  | |
| tutor\_id | int | |  | | --- | | Foreign Key referencing tutor\_id in the Tutor table. |  |  | | --- | |  | |
| subject\_id | int | |  | | --- | | Foreign Key referencing subject\_id in the Subject table. |  |  | | --- | |  | |
| status | varchar | |  | | --- | | The current status of the session (e.g., pending, completed). |  |  | | --- | |  | |
| created\_At | timestamp | Timestamp when the session was created. |

Table 8. **Messages**. Enables communication between students and tutors within a session.

|  |  |  |
| --- | --- | --- |
| **Attributes Name** | **Primary Key** | **Foreign Key** |
| session\_id | int | |  | | --- | | Foreign Key referencing session\_id in the Session table. |  |  | | --- | |  | |
| sender\_id | int | |  | | --- | | Foreign Key referencing user\_id of the sender. |  |  | | --- | |  | |
| message | text | |  | | --- | | The content of the message. |  |  | | --- | |  | |
| reciever\_id | int | |  | | --- | | Foreign Key referencing user\_id of the receiver. |  |  | | --- | |  | |
| send\_At | timestamp | Timestamp of when the message was sent. |

Table 9. **Rates**. Stores student feedback in the form of ratings for tutors.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  | | --- | | **Field Name** |  |  | | --- | |  | | |  | | --- | | **Data Type** |  |  | | --- | |  | | | **Description** | | --- |  |  | | --- | |  | |
| rate\_id | int | |  | | --- | | A unique identifier for each rating record (Primary Key). |  |  | | --- | |  | |
| student\_id | int | |  | | --- | | Foreign Key referencing student\_id in the Student table. |  |  | | --- | |  | |
| tutor\_id | int | |  | | --- | | Foreign Key referencing tutor\_id in the Tutor table. |  |  | | --- | |  | |
| rate | int | The rating given by the student (e.g., 1 to 5 stars). |

**Technical Requirements**

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|  |
| --- |
| user\_Id |
| username |
| email |
| salt |
| hash\_Password |
| role |
| created\_At |

|  |
| --- |
| tutor\_Id |
| student\_Id |
| user\_Id |
| GWA |
| availability |
| created\_At |

|  |
| --- |
| rate\_Id |
| student\_Id |
| tutor\_Id |
| rate |

|  |
| --- |
| tutor\_Id |
| subject\_Id |
| grade |

|  |
| --- |
| session\_Id |
| sender\_Id |
| message |
| receiver\_Id |
| send\_At |

|  |
| --- |
| department\_Id |
| department\_name |

|  |
| --- |
| subject\_Id |
| subject\_name |

|  |
| --- |
| student\_Id |
| user\_Id |
| first\_name |
| middle\_name |
| last\_name |
| year\_level |
| department\_Id |

|  |
| --- |
| session\_Id |
| student\_Id |
| tutor\_Id |
| subject\_Id |
| status |
| created\_At |

**Figure: Database Schema**

,lp