ISCO: AN RFID-BASED COMPLIANCE AND ACTIVITY TRACKER FOR ISKOLAR NG BATAAN WITH SMS NOTIFICATION

A Capstone Project

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by:

Balajo, Maridel Faith Odessa G.

Baltazar, Noemi Angelie C.

Fuertes, Cherwen Kirk M.

Tria, Robbie M.

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Chapter 1
INTRODUCTION

This chapter presents the background of the study, the problem statement, the study's objectives, its scope and limitations, and the significance of the study. The purpose of the introduction is to provide context for the proposed project.

Background of the Study

In this era, it is hard to find an organization that does not have some form of technology integrated into its operations. This is especially crucial for large-scale programs and services that cater to a wide audience. One example is scholarship programs, where countless processes occur behind the scenes, including compliance monitoring and record management. With thousands of scholars and multiple administrative tasks involved, it is important for these processes to be fast, accurate, and secure.

The Iskolar ng Bataan (INB) is an educational assistance program created under the mandate of EO No. AD 02, S-2005. Its primary function is to guarantee that there is at least one person from every family in the province who is contributing as a professional to the workforce within or beyond site Bataan. The program includes several initiatives, such as the College Scholarship Program for incoming and existing college students. New scholars undergo an orientation program, while ongoing scholars must fulfill all requirements to continue receiving financial assistance. For effective management of the program, each municipality has a dedicated municipality president assigned to govern the scholarship

program. These leaders organize activities, inform scholars, and ensure that all processes are smoothly run.

Compliance is a crucial aspect of the INB program. However, the current system relies on manual information dissemination, reminder systems, scorecards, and paper-based submissions, leading to long queues, misplaced records, and inefficiencies. Some municipalities tried to work around these issues by using generic solutions like Facebook Pages and Group Chat announcements, Google Forms, Google Classroom, and QR code technology. These methods may lessen the hassle of manual processes, but the root problem of not having a dedicated centralized digital compliance management system remains.

ISCO provides the INB program with a digitized platform for secure and efficient monitoring of activity which focuses on improving the manual process of tracking scholar compliance. Through the utilization of RFID technology and SMS notifications, not only human error is reduced, but transparency is also enhanced in the monitoring process.

The system aims to integrate the scholars' compliance methods into a single optimized platform for smooth processing. With a centralized management system, ISCO alleviates the inconvenience of navigating multiple applications and relieves the need for paper-based submissions. More than a tool, ISCO ensures a hassle-free experience that allows scholars to focus on what truly matters: education and future.

Statement of the Problem

The main problem of the study is how to develop a centralized system for the Iskolar ng Bataan (INB) program that addresses the inefficiencies of the current manual process by managing activities and scholar compliance through an integrated web, desktop, and Android application.

Specific Problems

- How to provide system access exclusively to authenticated scholars, officers, admins and super admin?
- How to enable the super admin to manage admins and officers under the Iskolar ng Bataan program?
- How to enable admins to manage scholars under the Iskolar ng Bataan program?
- How to provide admins key metrics to monitor scholar status, upcoming activities, and locality information?
- How to enable admins and officers to manage and post important announcements and activities within each designated locality?
- How to provide scholars with notifications on activities and announcements?
- How to provide scholars with an information feed to access announcements and activities?

- How to provide officers an automated compliance logging system to eliminate manual, paper-based transactions?
- How to enable admins to generate reports on scholar compliance for informed decision-making?

Objectives of the Study

The project's main objective is to develop ISCO: An RFID-based Compliance and Activity Tracker for Iskolar ng Bataan with SMS Notification to improve the current manual process by enhancing activity and scholar compliance management through an integrated web, desktop and Android application accessible to scholars, officers, admins and super admins.

Specifically, the study aims to:

- Design a system that is capable of:
    a. Ensuring proper authentication of scholars, officers, admins and super admins through the Login Module;
    b. Enabling super admins to manage officers and admins through the User Management Module;
    c. Enabling admins to manage scholars through the Scholar Management Module;
    d. Enabling admins to monitor key metrics consisting of scholar status, upcoming activities, and locality information through the Dashboard Module;

e. Enabling admins and officers to efficiently manage and post important announcements and activities through the Post Management Module;
f. Delivering notifications to scholars regarding activities and announcements through the Notification Module and SMS Technology;
g. Providing scholars with a structured platform to access announcements and activities through the Scholar Feed Module;
h. Automating compliance logging for officers and eliminating paper-based transactions through the RFID Logging Module;
i. Enabling admins to generate reports on scholar compliance, through the Report Generation Module.

- Create the system using Visual Studio Code, Visual Studio, Android Studio, Arduino IDE, Firebase, Twilio, Windows 11 OS and Android OS as software requirements and Computer Device, Android Device, Arduino Microcontroller and RC522 RFID Module as hardware requirements;
- Test and enhance the system in terms of functional suitability, efficiency, usability and security; and
- Evaluate the acceptability using ISO 25010 criteria such as functional suitability, efficiency, compatibility, usability, reliability, security, maintainability and portability.

Scope and Delimitations of the Study

The proposed ISCO system aims to modernize the operations of the Iskolar ng Bataan (INB) by addressing the inconveniences caused by the current manual

processes. Using the Login Module, scholars, officers, admins, and super admin can securely log in and access the designated areas of the system.

Scholars will be issued personalized RFID cards, replacing the traditional paper-based scorecard system. The RFID cards reduce long queues and automate compliance logging. Scholars will also have access to the Scholar Feed Module to view both provincial and municipality-specific information displayed. Such updates are notified to the scholars using the Notification Module and SMS Technology.

The officer, specifically the municipality president, will be able to post municipal-level activities and announcements using the Post Management Module. Additionally, only the officer is authorized to operate the RFID Logging Module, allowing secure compliance tracking during activities.

For admins, the system is designed to provide key metrics consisting of scholar status, upcoming activities, and locality information through the Dashboard Module. Additionally, the Scholar Management Module enables admins to manage scholars. Moreover, admins have access to post provincial-level activities and announcements through the Post Management Module. Finally, the Report Generation Module will allow admins to generate reports on scholar compliance.

For super admin, the task of creating accounts of admins and officers is provided by the system through the User Management Module.

However, the system has certain limitations. ATM distribution feature for scholars does not fall under ISCO, as the INB program has an established

partnership with a local bank to manage scholarship disbursements. Additionally, because the system is primarily designed for compliance monitoring, access is limited to verified scholars that are already enrolled in the INB program. As a result, ISCO does not support the application process for incoming scholars, since a separate website already exists for that purpose.

ISCO will be developed using Visual Studio Code for the web-app component, Visual Studio for the desktop component, Android Studio for the mobile component, and Arduino IDE for integrating the RFID functionality. For the database, Firebase will be utilized for cloud-based storage, and Twilio will be used for SMS notifications. The system will run on Windows 11 OS and Android OS. In terms of hardware, the system will use a Computer Device, Android Device, Arduino Microcontroller, and RC522 RFID Module.

To evaluate the system's effectiveness, the developers will apply the ISO 25010 criteria and conduct system testing with a target group of one hundred (100) random respondents currently operating under the INB program. The system will be assessed based on the eight main characteristics outlined in ISO 25010, namely functional suitability, efficiency, compatibility, usability, reliability, security, maintainability, and portability.

Significance of the Study

The ISCO system represents a significant step toward modernizing the Iskolar ng Bataan (INB) program by addressing the inefficiencies of the current manual processes. By integrating RFID technology, cloud-based data

management, and SMS technology into the desktop, web, and mobile system components, ISCO enhances the efficiency, accessibility, and overall experience for all stakeholders involved in the scholarship program.

To be more specific, the study benefits the following:

Scholars – The burden of the paper-based scorecard system and long queues will be eliminated upon the integration of RFID technology. ISCO also enables scholars to access compliance information and receive notifications digitally.

Officers – Officers for each municipality will benefit from a structured platform that simplifies the management of municipal-level activities. With the support of posting capability and RFID logging functionality, managing scholars within the officer's assigned municipality becomes hassle-free.

Admins – Facilitating the management of thousands of scholars becomes easier and more efficient through a centralized platform where admins oversee provincial-level compliance and generate reports that help in future operations and decisions.

Super Admin – Handles account creation and management of admins and officers securely.

Beyond individual beneficiaries, the study also contributes to educational institutions and government organizations in Bataan by showcasing a technology-driven scholarship program where processes are automated, reducing workload and human errors. Furthermore, ISCO extends beyond improving efficiency of the INB program, but also serves as a blueprint for future technological innovations that can enhance governance and public service delivery

Chapter 2
CONCEPTUAL FRAMEWORK

This chapter reviews related literature and studies relevant to the system, including similar applications, necessary software and hardware technologies, conceptual model of the study and operational definition of terms.

Review of Related Literature and Studies

Scholarship Compliance System

According to Davis R. (2024), scholarship compliance revolves around following legislations like eligibility standards, financial reporting, and anti-discrimination laws to preserve the honesty and legality of scholarship programs. Along with this, they also significantly impact the smooth running, and how scholarship programs are managed legally and ethically through the need to operate in strict conformity with regulations and guidelines.

Additionally, Reviewr (2024) emphasized the point that compliance tools for scholarships not only identify the students who have secured the scholarships but also give the education management system the opportunity to reconsider and also grant anonymity to the students who wish to review their scores. Therefore, these functions are accountable for awarding scholarships in a fair and open manner.

Moreover, TEQSA Compliance Guide (2021) explains that in the context of education, scholarship compliance includes activities that not only increase the

knowledge of a certain subject but also enables one to keep up with the continuous and constant evolution in scholars' particular professional domain.

To sum up, Scholarship Compliance Systems are responsible for the improved credibility and effectiveness of scholarship programs. In ISCO, the system automates compliance checks and tracks scholar activities and progress.

RFID Technology

Amsler S. (2021) stated, Radio Frequency Identification (RFID) is a type of data-communication system that utilizes electromagnetic waves for the purpose of identifying objects, animals, or human beings in a unique way. Physical contact or line-of-sight identification is not needed.

TT Electronics (2024) has been quoted in the tech business as saying RFID technology uplifts asset management, inventory control, and access security. Accordingly, this makes it possible to monitor hardware components in real-time, significantly cuts the supply chain flow time and provides for further safety through monitoring of authorized entrants into the facilities.

Furthermore, as stated by Nexess Solutions (2024), radio frequency identification (RFID) technology is being used on a large scale for tracking goods and inventory. Real-time communication is achieved with the help of this technology and at the same time, the error rate is reduced in various industries such as IT, logistics, and so forth which leads to automatic updates of the systems.

To conclude, RFID technology enhances accuracy, efficiency, and security by automating data collection. In ISCO, RFID is used to track scholars' compliance in real-time, reducing administrative workload and errors.

SMS Technology

Hanna K.T. (2024) emphasizes that SMS (Short Message Service) is the way that short text messages are sent and received between mobile devices. Also, SMS is a simple and easily accessible way of communication and hence, one of the most widespread means of communication across the world.

Similarly, as described by Alvarez Technology Group (2025), SMS is mainly used to connect with individuals through notifications, alerts, and authentication, hence providing a quick and efficient way of disseminating of information. As the majority of the population own mobile phones, this method is universally accepted while companies find it very convenient to use and user-friendly.

According to SendHub (2023), sending text alerts is more effective for schools and institutions to reach students with time-critical information like important notices or due dates of assignments, resulting in fast communication and high opening rates. This direct notification not only prevents missing the dates but also results in students' involvement and academic success.

Overall, SMS continues to be a primary means of real-time communication on the one hand because of its extensive adoption and reliability. For instance,

ISCO has SMS functionalities, which can be used to transmit critical information to the scholars instantly, such as notice about new activities and announcements.

Web Application Development

As Pour (2024) states, web application development refers to the utilization of software that is remotely hosted on the Internet for the users to work with. Web applications do not have to be downloaded to single personal computers, but they enable the provider to give engaging, real-time responses to the user.

Moreover, Johnston (2025) stated, the use of web applications has spread throughout most of the sectors and is used as an effective means of reaching customers and keeping them involved. Web Applications are of service to make available the platform that provides real-time updates, customized experiences, and interactive features through which they become the most appropriate solution for current business demands.

Furthermore, according to Upwork (2025), web applications provide useful data on users' behavior that enable companies to personalize their services and enhance customer satisfaction. Companies also facilitate user engagement by providing real-time interfaces for users to interact with applications the same way users do with native desktop or mobile apps.

All in all, Web application development is significantly responsible for timely, efficient, and user-friendly platforms that boost user participation. In that of ISCO, the web-based applications provide the admins and super admin with one central

entry point, thereby making sure that tracking of compliance and management of operations are not only accessible but also efficient at all times.

Desktop Application Development

Arturion.io (2023) defines desktop application development as the creation of software that runs directly on a computer without the need for internet access. These applications offer high efficiency and better access to system resources, making them ideal for tasks requiring heavy processing or offline functionality.

Additionally, Martin (2024) points out that desktop applications serve various functions—from productivity tools and media editors to gaming and utility software. Their ability to fully leverage hardware capabilities ensures smooth performance and secure system operations.

Moreover, Katariya (2024) explains that desktop apps are typically built for specific operating systems using languages like C++, Java, or Python. These apps are highly customizable, faster, and allow more control over system resources, making them well-suited for complex, resource-intensive tasks. Such level of control is especially valuable in projects that demand secure and uninterrupted system-level operations.

In summary, desktop application development plays a key role in software solutions that demand speed, reliability, and offline accessibility. For the ISCO project, this ensures compliance and monitoring processes remain smooth, secure, and highly functional.

Android Application Development

Patel (2023) defines Android application development as creating apps for Android devices using languages like Java and Kotlin, with tools like Android Studio and the Android SDK. This approach helps developers create efficient, evolving apps that transform how people and organizations work.

Additionally, GeeksforGeeks (2025) points out that Android applications are capable of executing an array of tasks, including but not limited to social networking and entertainment, making use of features such as camera access, GPS, and push notifications. Notably, these applications play a critical role in the digital transformation journey of new, as well as old, companies wanting to grab customer loyalty and to have mobile services with no time.

Moreover, TutorialsPoint (2024) mentions that Android apps developed mostly in Java using the Android SDK provide the possibility to be flexible and are very easily distributed through such a platform as the Google Play Store. Android open-source enables programmers to efficiently use apps according to the hardware features or performance requirements.

To sum it up, the development of Android applications is mandatory to construct swift, responsive, and approachable mobile solutions. In relation to ISCO, Android applications not only improve mobility but also make certain that the user is always in real-time which will eventually raise the compliance checking and system monitoring level.

ISO 25010

Salehi (2025), explains that ISO 25010 is an international standard used to evaluate and enhance software quality. It includes two main models: the Product Quality Model, which focuses on software properties, and the Quality in Use Model, which assesses user efficiency and satisfaction in a specific context.

Similarly, Rebeś & Rebeś (2025) highlight that ISO 25010 covers essential software quality aspects, such as functional suitability, performance, usability, security, and more. It helps organizations align their software with both technical specifications and user needs, ultimately leading to high-quality products.

As per ISO (2025), ISO 25010 defines eight principal properties of software quality, with every characteristic having sub-characteristics of its own. The key aspects that constitute functional suitability, performance efficiency, usability, reliability, and security have a great deal of significance in the making of a software product that will be acceptable both technically and user-friendly. Besides, the framework promotes a common ground for the stakeholders to exchange opinions on and to evaluate the software.

Overall, ISO 25010 and among other aspects, is a factor that undoubtedly makes a big contribution to software production in which there is a systematic process of software quality control that is shaping up. One of the strengths of this approach is that it can be utilized by organizations to optimize software processes, get customer satisfaction confirmations, and deliver effective, efficient, user-centric software solutions.

Google Classroom

Edwards (2024) stated that Google Classroom is a collection of online tools that allows teachers to set assignments, have students submit work, mark, and return graded papers. It is a pivotal platform that has become a way for students and teachers to share information and assignments more efficiently. It integrates with Google Docs, Sheets, Slides, Sites, Earth, Calendar, and Gmail and can run with Google Hangouts or Meet for live teaching sessions.

Moreover, Main (2022) added that Google Classroom is free to use and compatible with almost any device that has a web browser. It is beneficial to use as it is feasible to work offline on most devices and upload when there is an internet connection. This allows students and teachers to access and use Google Classroom from any personal device.

Furthermore, Oktaria and Rahmayadevi (2021) highlight that Google Classroom is an effective and accessible learning tool that promotes student engagement through active participation in online discussions and tasks. It encourages creative use of its features to support meaningful learning experiences and helps enhance students' skills, discipline, and independent learning through easily accessible teaching materials.

In summary, Google Classroom and ISCO share a similar goal of collecting multiple tools and services into one location or centralized system. The difference between these two applications is their purpose. Google Classroom is a general digital classroom environment, while ISCO is meant for scholar compliance.

eGovPH App

Dequito (2024) described the eGovPH app as a single platform where Filipinos can digitally store and access their government-issued identity documents, such as the National ID and Professional Regulation Commission (PRC) ID. It also offers services for multiple government agencies. Aiming to reduce the time citizens spend queuing for IDs and to enhance the overall efficiency of government services.

Additionally, Jou et al. (2024) stated the activities that users are able to perform, such as SIM registration, business registration, tax payment, accessing social security benefits, processing valid personal identification in digital format, engaging with e-tourism and e-travel guides, processing job applications, accessing healthcare information and feedback, conducting e-payments and banking services, and accessing helpful news. The versatility of the app provides convenience by lessening the economic cost of people traveling to and from physical government agencies.

Moreover, Celdran (2024) emphasized that the app has connected to over 600 local government units (LGUs) nationwide delivering efficiency, cost-effectiveness, and convenience. It eliminates redundant processes, making transactions quicker and more accurate.

Overall, both eGov PH and ISCO are applications meant to digitalize and modernize government-related processes. Adhering to the government's goal of establishing digital governance and efficiency. However, while eGov PH

encompasses national government services meant to cater to all Filipino citizens, ISCO handles a local government program in Bataan.

Connecteam

Xenia (2025) described Connecteam as a software tool responsible for tracking time and providing a wide range of functions designed to boost teamwork and efficiency. It serves as a one-stop shop for all business operation needs. By serving as an HR tool, a time clock, a scheduling tool, a task management tool, a way to complete digital forms and checklists, and even a platform for team communication.

In addition, Kortelainen et al. (2021) added that Connecteam provides an information-sharing and management environment for a mobilized organization. It focuses on sharing relevant, up-to-date information between the key stakeholders and people. Connecteam combines the work of deskless employees and managers with real-time reporting, information sharing, updates, and announcements.

Furthermore, Fleischmann (2024) explained that Connecteam is a platform designed to revolutionize the way a company stays connected, informed, and engaged. Employees have the tools to organize daily tasks and a digital checklist to make work more efficient. Additionally, the central knowledge base provides handbooks and tutorials that provide the information needed to complete a task. Connecteam is accessible regardless of location because it is available on multiple platforms.

Given these points, Connecteam and ISCO share similar features, which are centralized management, role-based access, multi-platform availability, notifications, and report generation. While these two applications share common features and ideology, Connecteam targets employee time and task tracking, while ISCO is designed for scholar compliance monitoring.

Software Requirements

The software requirements that will be used to develop the proposed system are Visual Studio Code, Visual Studio, Android Studio, Arduino IDE, Firebase and Twilio.

Visual Studio Code

Roberts (2024) described Visual Studio Code as a lightweight, open-source code editor that offers various customization options for a personalized development environment. Such capability makes Visual Studio Code a development tool that combines simplicity and flexibility in its design.

Moreover, Tuama (2023) emphasized that Visual Studio Code supports multiple programming languages such as C++, Java, HTML, CSS, and JavaScript, making it versatile for projects that require varied coding. Additionally, a vast library of extensions is also available for installation where developers can hand-pick on what to integrate based on specific development needs.

Heller (2022) added the other built-in tools of Visual Studio Code, including intelligent code completion, graphical debugging, multi-cursor editing, and built-in

Git integration. In a collaborative setting, such tools are crucial for an efficient workflow across multiple team members.

Thus, with the mentioned features, Visual Studio Code will serve as the code editor for the web application component of the ISCO system.

Visual Studio

Murali (2023) defined Visual Studio as a powerful, code-focused integrated development environment (IDE) designed for the creation of web, mobile, and desktop applications. Unlike basic editors, Visual Studio includes advanced debugging tools and extensive support for various development frameworks.

In addition, Roberts (2024) verified that Visual Studio is a full-fledged IDE designed primarily for Windows and Mac platforms. With primary support for C# and .NET framework, Visual Studio offers a robust set of tools perfect for building complex applications.

NDepend (2025) also pointed out how Visual Studio is particularly suited for large-scale projects involving Windows-specific development, such as Windows Forms applications. This feature allows developers to choose from a variety of templates and components to creatively design their projects.

In conclusion, Visual Studio will give robust set of development capabilities and tools that will mark as a strong foundation for building the desktop component of the ISCO system.

Android Studio

Badrinath (2024) noted Android Studio as the official integrated development environment (IDE) for Android application development. Launched by Google in 2013, Android Studio is a powerful code editor with features like code completion and real-time error checking, and a built-in emulator for testing apps across various devices and configurations.

Harwani (2023) further elaborated on Android Studio's capabilities, such as its easy drag-and-drop interface for user interface design, a code editor that supports programming languages like Java and Kotlin, and real-time previewing of the system across different device sizes and orientations.

With reference to Baker (2025), Android Studio can also integrate third-party software like GitHub and Firebase, increasing convenience for developers by replacing complex integrations with built-in, user-friendly instructions that simplify the process.

To summarize, Android Studio brings variety of useful features that will be utilized in developing the mobile component of the ISCO system.

Arduino IDE

Andandprof (2024) explained Arduino IDE as an open-source software used to program Arduino boards. It supports C/C++ programming and is highly compatible with multiple operating systems, making it a versatile tool for creating digital and interactive projects.

Additionally, Joseph (2022) specified Arduino IDE's features like code editor, compiler and serial console that helps on facilitating Arduino board programming. Furthermore, it provides debugging support, a serial plotter, a powerful set of tools for troubleshooting and analyzing the performance of projects.

Pacelt (2021) also clarified that Arduino IDE is not only a software tool but also part of an open-source hardware platform. Arduino's open-source nature enables users to collaborate, build, and share interactive projects like robots and wearable tech, encouraging peer review and continuous improvement.

Overall, Arduino IDE will be an essential tool for building the Arduino hardware for RFID scanning functionality and integrating it with the ISCO software.

Firebase

According to Hansana (2024), Firebase is a comprehensive mobile and web application development platform offered by Google, providing a wide range of services that can be integrated by developers on their development.

Marcelino (2024) outlined the various services offered by Firebase, categorized into App Creation Services, Quality Assurance, and Business Growth Tools. The App Creation Services are particularly relevant to this project, especially the Realtime Database, Cloud Firestore, Firebase Authentication, and Cloud Storage.

In addition, Merino (2024) highlighted the significance of Firebase's free tier, which provides developers with access to a wide range of essential services without the need for immediate payment. However, as the project grows, services

like Cloud Storage, Hosting, and Realtime Database come with usage limits, but Firebase's automatic scalability ensures that developers only pay for what they need as their projects expand.

Altogether, Firebase will serve as the primary database for the ISCO system, responsible for essential back-end services such as authentication and real-time data querying.

Twilio

Pires (2023) illustrated Twilio as a cloud communication platform that utilizes Application Programming Interfaces (APIs) to integrate voice, video, and messaging functionalities into applications. It is considered one of the go-to solutions for enabling communication features within modern systems and applications.

Furthermore, Drozdov (2021) explained how Twilio achieves the communication functionalities, supporting messaging services such as SMS, MMS, and WhatsApp, as well as voice and video capabilities that promote strong user engagement.

Marthinusen (2022) also indicated the pay-as-you-go pricing model of Twilio, making it a cost-effective choice since it avoids large upfront fees. Not only the pricing, but Twiliio also has a comprehensive documentation that saves developers from the hassle of complexity by simplifying the integration process.

Hence, for the proposed system, Twilio will be utilized for sending SMS notifications, providing real-time updates and reminders to the scholars.

Hardware Requirements

The hardware needed for the development of the system includes a Computer Device, an Android Device, an Arduino microcontroller, and an RC522 RFID module.

Computer Device

Beal (2023) stated that a computer is an electronic device capable of being programmed to take user inputs, process data, and generate outputs. Computers can receive a set of instructions and execute programs that range from simple calculations to complex operations.

To add, Brooks (2024) highlighted that computers have become crucial instruments for progress and innovation, offering the necessary infrastructure for developing complex software applications and facilitating the creation and execution of programs.

In the same manner, American Public University (2024) stressed that computers provide the best environment for writing, testing, and debugging programs. Many Integrated Development Environments (IDEs) such as Visual Studio Code, Visual Studio, and Android Studio are most compatible with computer devices, making computer devices essential tools for software development.

In conclusion, a computer device will serve as the primary tool for developing the ISCO system.

Android Device

Burkinshaw (2024) described Android devices to be smartphones that run on Google's Android OS. With over 70% of global market share, Android devices offer a wide range of apps and multitasking features, along with regular software updates that enhance functionality.

Ellis (2025) outlined the key features of an Android Device, including the user-friendly interface, multitasking capabilities, and extensive app ecosystem, all of which contribute to its popularity in the development industry.

Not only that, Kumar (2024) focused on the mobile environments that an Android device offers for app development, such as Android SDK frameworks, networking capabilities like Wi-Fi or mobile data, and SMS support, which align with the features of the app.

Hence, an Android Device will be used as the main platform to test and develop the mobile component of the ISCO system.

Arduino Microcontroller

Cheich (2024) described Arduino Microcontroller as a physical hardware platform composed of various boards, such as the popular Arduino UNO. These microcontrollers function as small computers that process inputs and control outputs, forming the foundation of Arduino-based projects.

Ashley (2021) further enumerated the components of the Arduino Microcontroller, such as the Atmega328 AVR chip, six analog input pins, and

fourteen digital I/O pins, proving it well-suited for controlling and sensing external modules.

Kriti (2024) also stated the versatility of the Arduino Microcontroller, highlighting its use in robotics, smart home automation, wearable technology, and other interactive electronic projects. Combined with the small size and ease of programming, Arduino Microcontroller is well-suited for both hobby and professional applications.

Thus, the Arduino Microcontroller will be the bridge between the IoT components and the software components of the ISCO system.

RC522 RFID Module

LME Editorial Staff (2025) defined RFID (Radio Frequency Identification) as a system made up of a reader and a tag. The reader emits an electromagnetic field that powers passive tags upon entry, prompting them to transmit stored data back, enabling object identification and tracking.

Sanketh (2021) specified the operation of the RC522 RFID Reader module, which uses a 13.56MHz electromagnetic field to communicate with RFID tags via SPI, I2C, and UART protocols. The module operates at 2.5 to 3.3V and is 5V logic-tolerant, ensuring compatibility with Arduino and other 5V microcontrollers.

Furthermore, Paradox (2022) highlighted the advantages of the RC522 RFID Reader module, with it being affordable and available in most electronic markets. This makes it an excellent choice for the ISCO system, providing a cost-effective and reliable solution for RFID-based tracking and compliance monitoring.

Therefore, RC522 RFID Module will serve as the IoT hardware that will track scholar attendance and compliance for the ISCO system.

Conceptual Model of the Study

The Conceptual Model of the Study represents the theoretical concepts of the study visually. This includes knowledge requirements, software requirements, hardware requirements, process, expected output, and evaluation of the proposed system.

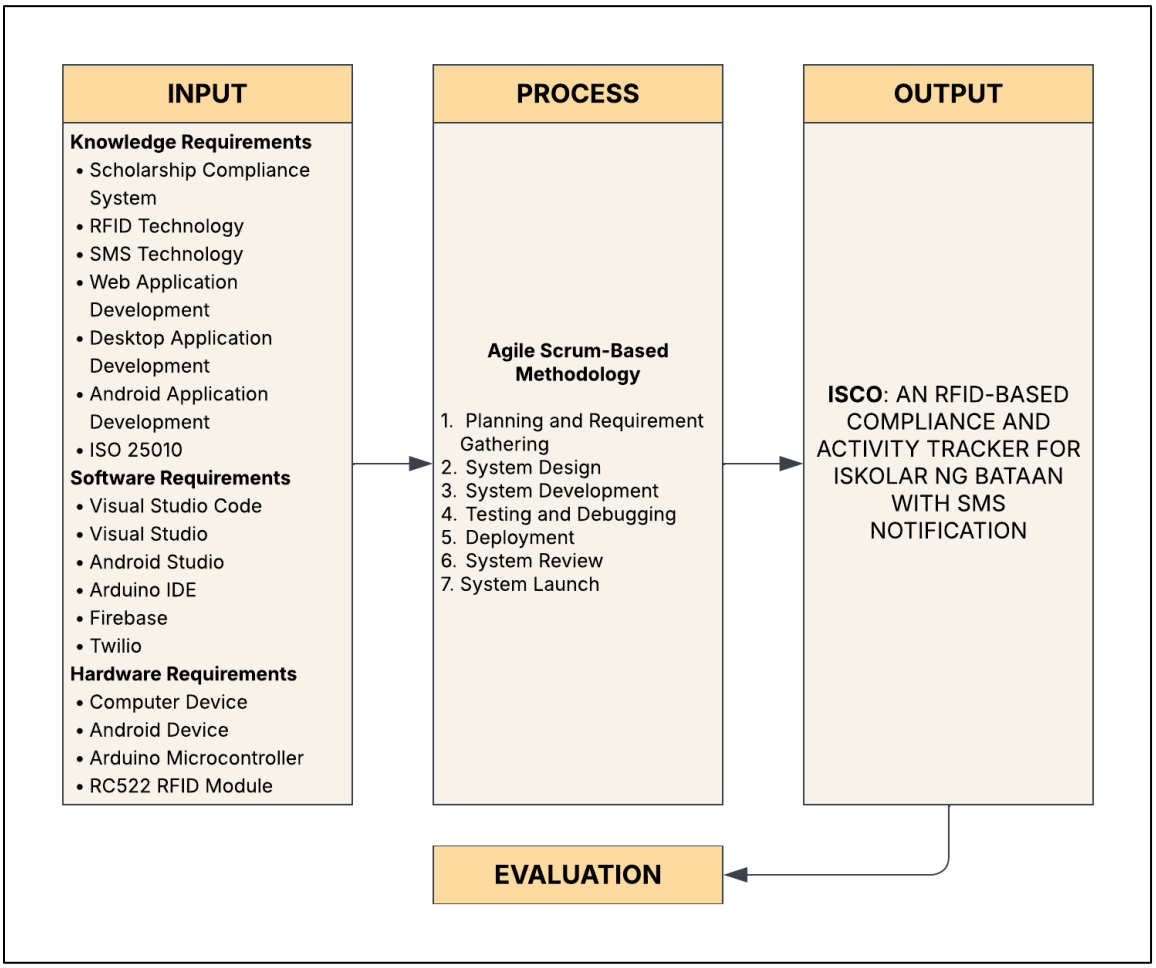

Figure 1. Conceptual Model of the Study

Figure 1 on the previous page showcases the conceptual model of the system divided into four phases, namely Input, Process, Output, and Evaluation.

The input phase is categorized into three parts, which are the Knowledge Requirements, Software Requirements, and Hardware Requirements. The group must exercise enough knowledge about the Scholarship Compliance System, RFID Technology, SMS Technology, Web Application Development, Desktop Application Development, Android Application Development, and ISO 25010. The software requirements involve utilizing Visual Studio Code, Visual Studio, Android Studio, Arduino IDE, Firebase and Twilio. The group must also acquire a Computer Device, an Android Device, an Arduino Microcontroller, and RC522 RFID Module for the system's hardware requirements.

The inputs will then be processed in an Agile Scrum-Based Methodology, which includes Planning and Requirement Gathering, System Design, System Development, Testing and Debugging, Deployment, System Review and System Launch.

The expected output after combining the Input and Process phase is the system itself ISCO: An RFID-based Compliance and Activity Tracker for Iskolar ng Bataan with SMS Notification.

Finally, the developed system is evaluated to assess its effectiveness and usability in the Evaluation phase.

Operational Definition of Terms

The following are the terms that operationally defined for a better understanding of the study:

ISCO: An RFID-Based Compliance and Activity Tracker for Iskolar ng Bataan with SMS Notification - The proposed system that will help in innovating the management of the Iskolar ng Bataan (INB) program.

Scholars - Refers to student beneficiaries of the INB program, whose activities and compliance are tracked by the ISCO system.

Officers - The elected municipality president responsible for overseeing and managing the activities within the INB program at the municipal level and facilitating the RFID Logging components.

Admins - The team of officials of the INB program are responsible for managing the system at the provincial level and overseeing the general operation of the ISCO system.

Super Admin - The head official who handles and distributes the accounts of the admins and officers.

Municipality: Refers to the municipality in Bataan where the scholars are within.

Cluster: A sub-division within a municipality, where barangays are grouped within.

Barangay: The smallest unit of local government, representing the barangay in which the scholars live.

Chapter 3
METHODOLOGY

This chapter presents the Project Design and Unified Modeling Language (UML) diagrams, such as the Use Case Diagram and Activity Diagram. It also covers the Database Design, which includes the Entity-Relationship Model and Data Dictionary, as well as the Project Development, Gantt Chart, and the Operating and Testing Procedures.

Project Design

The proposed system ISCO is designed to assist the Iskolar ng Bataan (INB) program in overseeing the compliance operations. The proposed system will have four user categories, authenticated via their account credentials. Scholars can receive notifications, view activities and announcements, and comply accordingly. Officers can post activities and announcements and record activity compliance with RFID in their assigned municipality. Admins can access a centralized dashboard, manage activities and announcements on a provincial scale, manage scholars, and generate reports. Super admins facilitate the account creation of the officers and admins.

Unified Modeling Language

As Sheldon (2021) pointed out, the Unified Modeling Language (UML) is a modeling language to the standard that supplies a general-purpose development framework for the visuals of software system designs. This helps the visualization of system architectures, processes, and the relationship between these components and making work much easier in the software development process.

Use Case Diagram

Based on GeeksforGeeks (2024), Use Case Diagrams are Unified Modelling Language (UML) behavioral diagrams that define a system's functional requirements and interaction with outside entities relevant to system processes and functions. These diagrams represent the functionality of a system in a more abstract manner. Use case Diagrams set the limits of the system and specify the parameters regarding the system functionality.

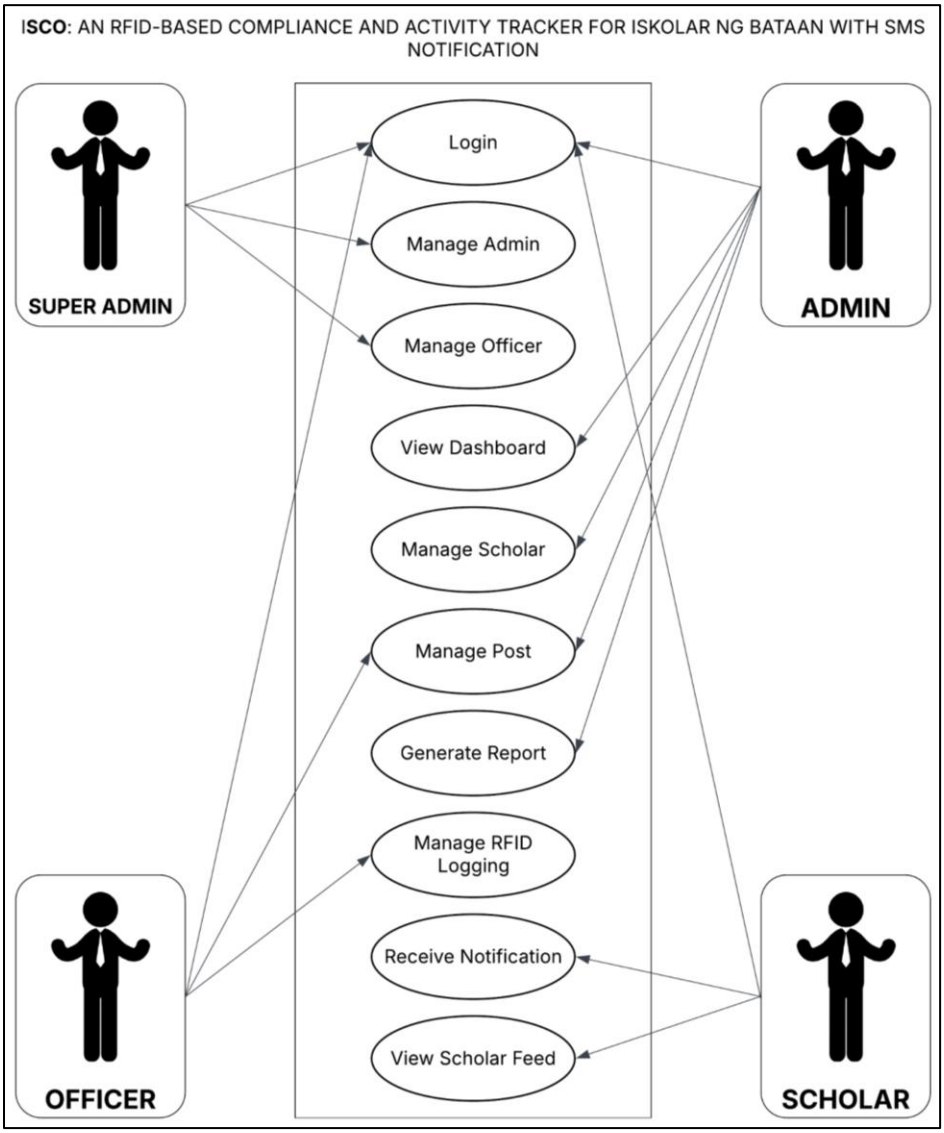

Figure 2. Use Case Diagram

Figure 2 on the previous page displays the Use Case Diagram of ISCO. This diagram illustrates the overall functions and interactions between the system and its intended users. Since the system is designed to be operated only by parties under the Iskolar ng Bataan (INB) program, all users are required to authenticate and log in before being presented with their respective interfaces, namely, the scholars, officers, admins and super admin.

The super admin can manage both admins and officers accounts. Admins can access the dashboard, manage scholars, manage posts, and generate reports at the provincial level. Meanwhile, Officers can also manage posts, but only at the municipal level, and operate the RFID logging module. Finally, scholars can receive notifications and view scholar feed for compliance purposes.

Activity Diagram

As highlighted by GeeksforGeeks (2024), Activity Diagrams are yet another type of behavioral diagram in Unified Modeling Language (UML) used to illustrate the dynamic feature of a system, specifically its flow from one activity to another in a logical sequence. The diagram shows how various actions are interconnected and how a system emanates from one state to another, effectively representing both simple and complex workflows with clarity and structure. These diagrams assist in business process and operational workflow modeling by representing actions, points of decision, and processes occurring simultaneously within a system.

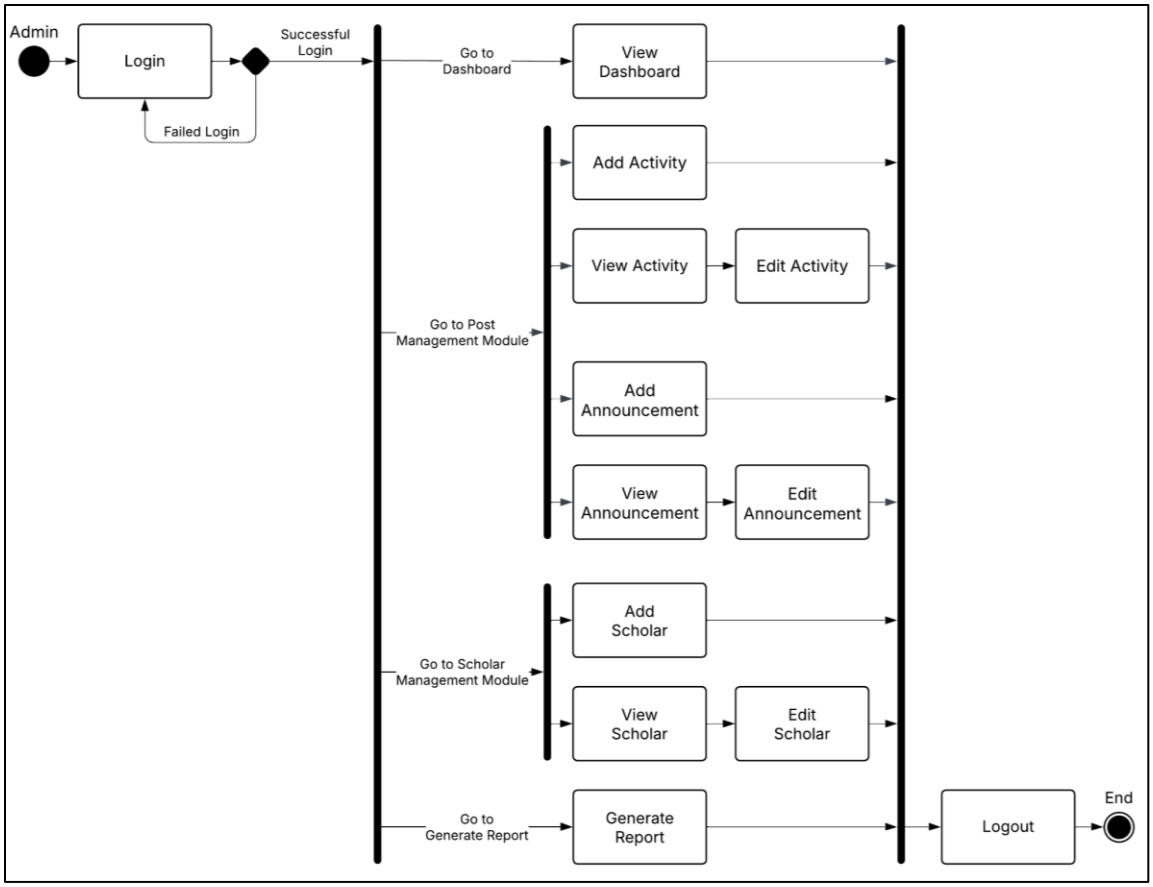

Figure 3. Activity Diagram (Admin's Side)

Figure 3 from previous page displays the activity diagram of the admin's side. To access the system, the admin must first log in using valid credentials. If the input values are invalid, a failed login will be triggered, and the admin must log in again with the correct inputs. When the input is valid, the admin will be loaded into the dashboard, which contains the number of registered scholars, the number of active and inactive scholars, the upcoming activities, and the locality information. Through the Post Management Module, the admin can post activities or announcements, the admin can also view existing activities or announcements and edit them. In the Scholar Management Module, the admin can add scholars, view

their details, and edit existing information. The admin can generate reports on scholar compliance in the Generate Report Module. The admin can end the transaction by logging out of the system.

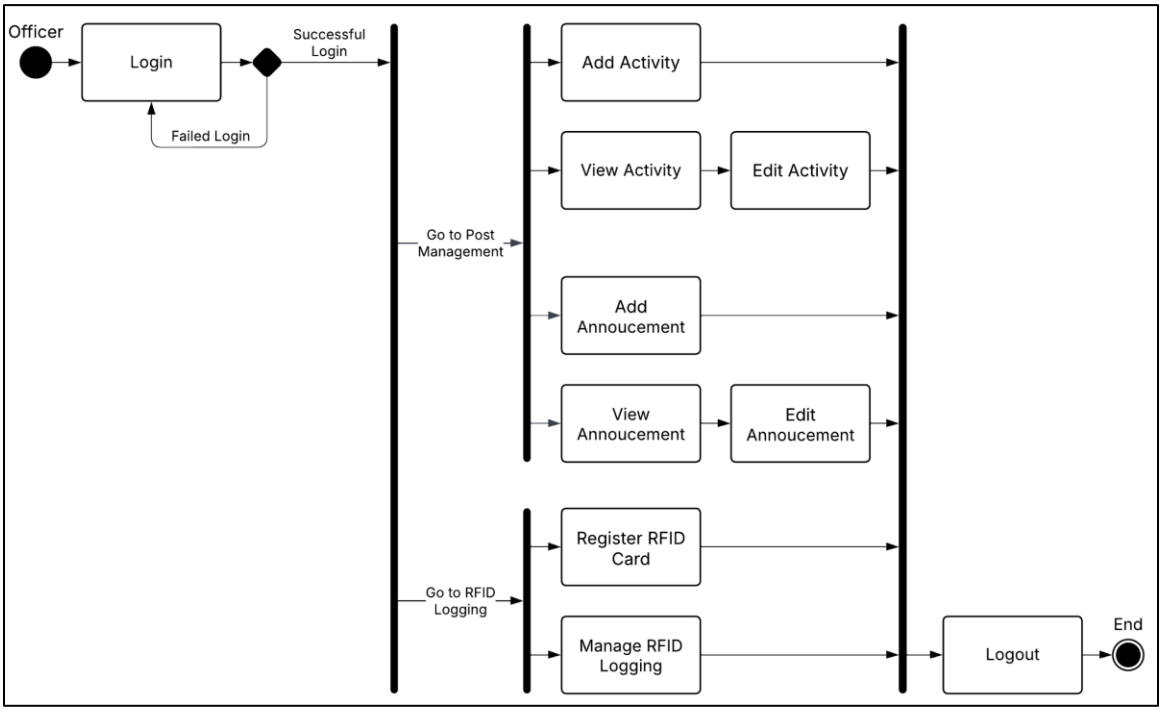

Figure 4. Activity Diagram (Officer's Side)

Figure 4 displays the activity diagram of the officer's side. To begin system access, the officer must provide a valid username and password. In case of invalid input, the login must be retried until successful. Upon successful login, the system redirects to the Post Management Module, which enables the addition, viewing, and editing of scholar-related activities and announcements at the municipal level. The RFID Logging Module provides access to functions such as RFID card registration and the management of RFID data logs, which serve to monitor scholar

compliance in activities. After performing the assigned duties, the officer may proceed to log out, effectively ending the session.

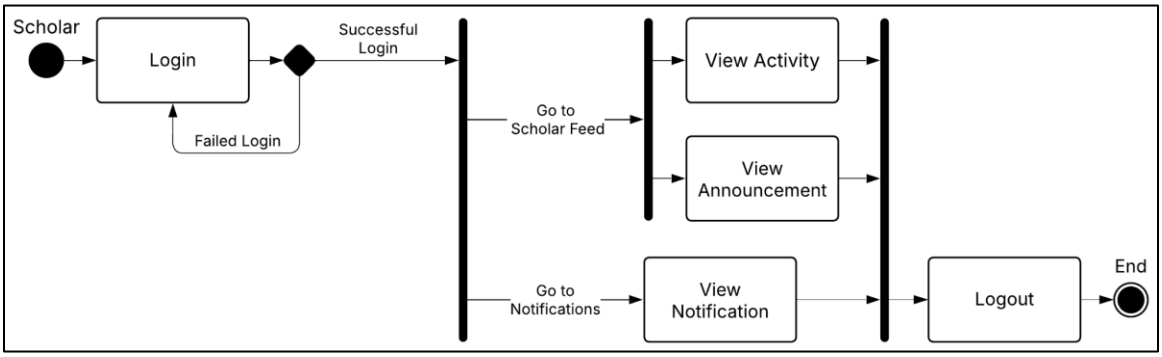

Figure 5. Activity Diagram (Scholar's Side)

Figure 5 displays the activity diagram of the scholar's side. To access the system, the scholar must first log in using a valid username and password. If the input is invalid, the system prompts for another attempt. Once login is successful, the system redirects to the Scholar Feed Module, where posted activities and announcements from both provincial and municipal levels are displayed. Additionally, the Notifications Module notifies scholars about the posted activities and announcements. After the necessary actions are completed, the scholar can log out to securely end the session.

Database Design

The database design discusses the entity-relationship model and the data dictionary used in the proposed system. The major tables include the Authentication table, Scholars table, Officers table, Admins table, Municipalities

table, Clusters table, Barangays table, Activities table, Announcements table, Compliances table and Notifications table.

Entity-Relationship Model (ERM)

Görög (2025) stated that the Entity-Relationship Model (ERM) is a graphical tool in the database design that is employed to visualize the data structure. ERM identifies entities, attributes, and relationships. In addition, ERM is commonly employed at the beginning of system development to illustrate the location and retrieval of data. Finally, ERM serves to make the representation of complex data structures easier, to improve the interactions between system developers and users, and to ensure efficient and accurate database realization.

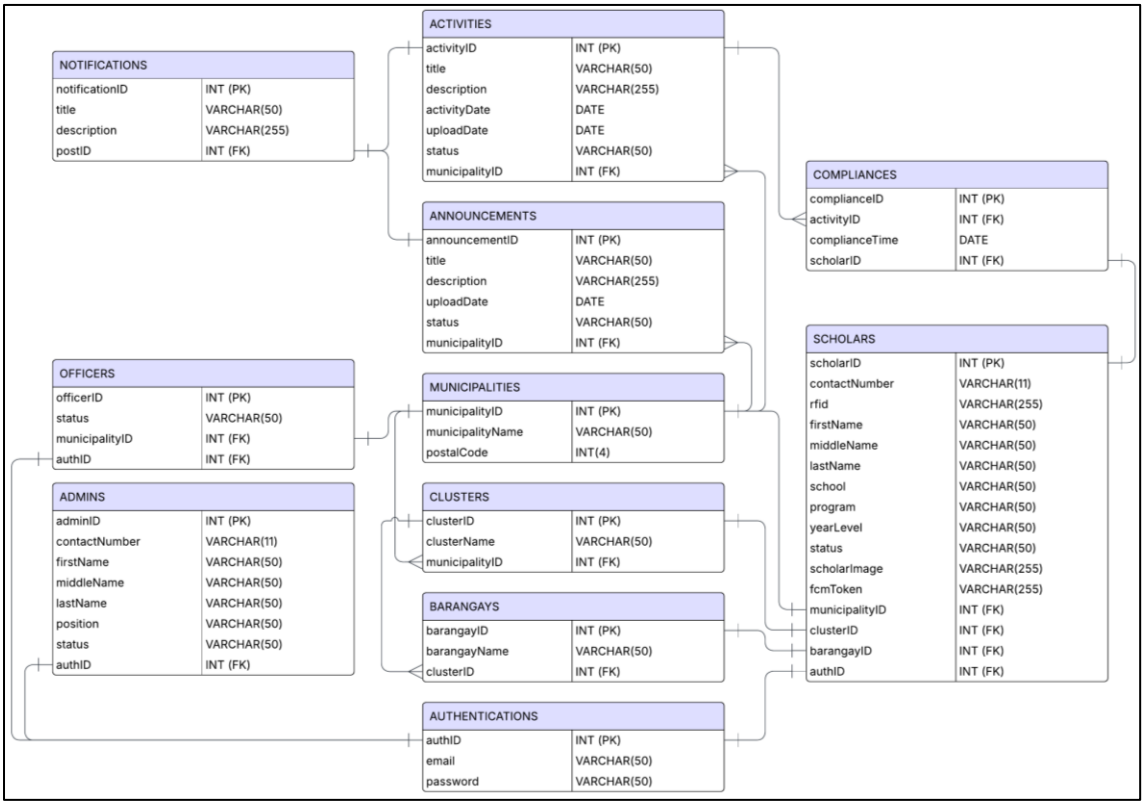

Figure 6. Entity-Relationship Model

Figure 6 from the previous page displays the Entity-Relationship Model that consists of ten (11) tables that stores the different data used inside the ISCO system.

The Authentications table holds the login credentials of all users, which is referenced by the Scholars, Officers and Admins table to allow the system to only query a single table during the login of different user roles.

The Scholars table holds the details of each scholar that is essential for the compliance tracking of Iskolar ng Bataan. The Officers table consists of data that references it to its corresponding locality and its current status. The Admins table stores the data of the Iskolar ng Bataan official coordinators such as their name, contact number, status and position.

The Municipalities, Clusters and Barangays tables relates to one another accordingly to ensure which clusters belong to a municipality and which barangays belong to a cluster, effectively forming the locality information.

The Activities and Announcements tables stores all the information that Admins and Officers disseminate among the Scholars. The Compliances table holds the record of the compliance of each scholar in a certain activity. The Notifications table stores the corresponding notification for each activity or announcement.

Data Dictionary

As defined by Panja et al. (2022), the Data Dictionary is a textual description of data objects and their interrelationships that can be accessed directly by users

or the database administrators when needed. It describes the meanings and purposes of data elements within the context of a project and provides guidance on interpretation, accepted meanings, and representation. Consequently, data dictionaries assist users in managing data to avoid data inconsistencies, data redundancy, and provide consistency in the collection and use of data.

Table 1. Scholars Table

Data Dictionary				
System Name: ISCO: An RFID-based Compliance and Activity Tracker for Iskolar ng Bataan with SMS Notification				
Subject: Scholars Table				
PK	**FK**	**Field Name**	**Data Type**	**Description**
Yes	No	scholarID	Integer	Scholar Identification Number
	No	contactNumber	Varchar	Scholar's Contact Number
	No	rfid	Varchar	Scholar's rfid
	No	firstName	Varchar	Scholar's First Name
	No	middleName	Varchar	Scholar's Middle Name
	No	lastName	Varchar	Scholar's Last Name
	No	school	Varchar	Scholar's School Name
	No	program	Varchar	Scholar's Program
	No	yearLevel	Varchar	Scholar's Year Level
	No	status	Varchar	Scholar's Status
	No	scholarImage	Varchar	Scholar's Profile Picture

	No	fcmToken	Varchar	Scholar's Token for Notification
	Yes	municipalityID	Integer	Municipality Identification Number
	Yes	clusterID	Integer	Cluster Identification Number
	Yes	barangayID	Integer	Scholar's Barangay
	Yes	authID	Integer	Authentication Identification Number

Table 1 shows the scholars table of ISCO: An RFID-based Compliance and Activity Tracker for Iskolar ng Bataan with SMS Notification. The table stores the information of the scholars. The table's fields are scholarID, contactNumber, rfid, firstName, middleName, lastName, school, program, yearLevel, status, scholarImage, fcmTokenm, municipalityID, clusterID, barangayID and authID.

Table 2. Activities Table

Data Dictionary				
System Name: ISCO: An RFID-based Compliance and Activity Tracker for Iskolar ng Bataan with SMS Notification				
Subject: Activities Table				
PK	**FK**	**Field Name**	**Data Type**	**Description**
Yes	No	activityID	Integer	Activity Identification Number
	No	title	Varchar	Activity Title
	No	description	Varchar	Activity Description

	No	activityName	Date	Activity Name
	No	uploadDate	Date	Activity Upload Date
	No	status	Varchar	Activity Status
	Yes	municipalityID	Integer	Municipality Identification Number

Table 2 shows the activities table of ISCO: An RFID-based Compliance and Activity Tracker for Iskolar ng Bataan with SMS Notification. The table stores the information of the activities. The table's fields are activityID, title, description, activityName, uploadDate, status and municipalityID.

Table 3. Compliances Table

Data Dictionary				
System Name: ISCO: An RFID-based Compliance and Activity Tracker for Iskolar ng Bataan with SMS Notification				
Subject: Compliances Table				
PK	**FK**	**Field Name**	**Data Type**	**Description**
Yes	No	complianceID	Integer	Compliance Identification Number
	Yes	activityID	Varchar	Activity Identification Number
	No	complianceTime	Date	Compliance's Time
	Yes	scholarID	Integer	Scholar Identification Number

Table 3 shows the compliances table of ISCO: An RFID-based Compliance and Activity Tracker for Iskolar ng Bataan with SMS Notification. The table stores

the information of the compliances. The table's fields are complianceID, activityID, complianceTime and scholarID.

Project Development

Podoba (2023) described Agile as a set of practices in software development centered on adaptability and responsiveness to change. Agile promotes flexibility by encouraging continuous feedback and iterative development. In addition, Scrum methodology is highlighted by Podoba for its structured approach. In Scrum, project development is divided into short, time-boxed iterations called sprints, typically lasting a week or more. Each sprint focuses on gradually transforming a working draft into a refined product, allowing teams to incorporate feedback, reassess priorities, and adjust plans as needed.

Scrum methodology was chosen to be adopted for the development of ISCO: An RFID-based Compliance and Activity Tracker for Iskolar ng Bataan with SMS Notification. Given that consultations, client feedback, and iterative revisions are expected throughout its development, Scrum provides an ideal and flexible framework. Its sprint-based structure allows the development team to deliver functional increments of the system regularly, enabling early detection of issues, prompt integration of client inputs, and continuous refinement of features based on evolving project needs. This approach ensures that the system remains aligned with user expectations while maintaining a steady and manageable development pace.

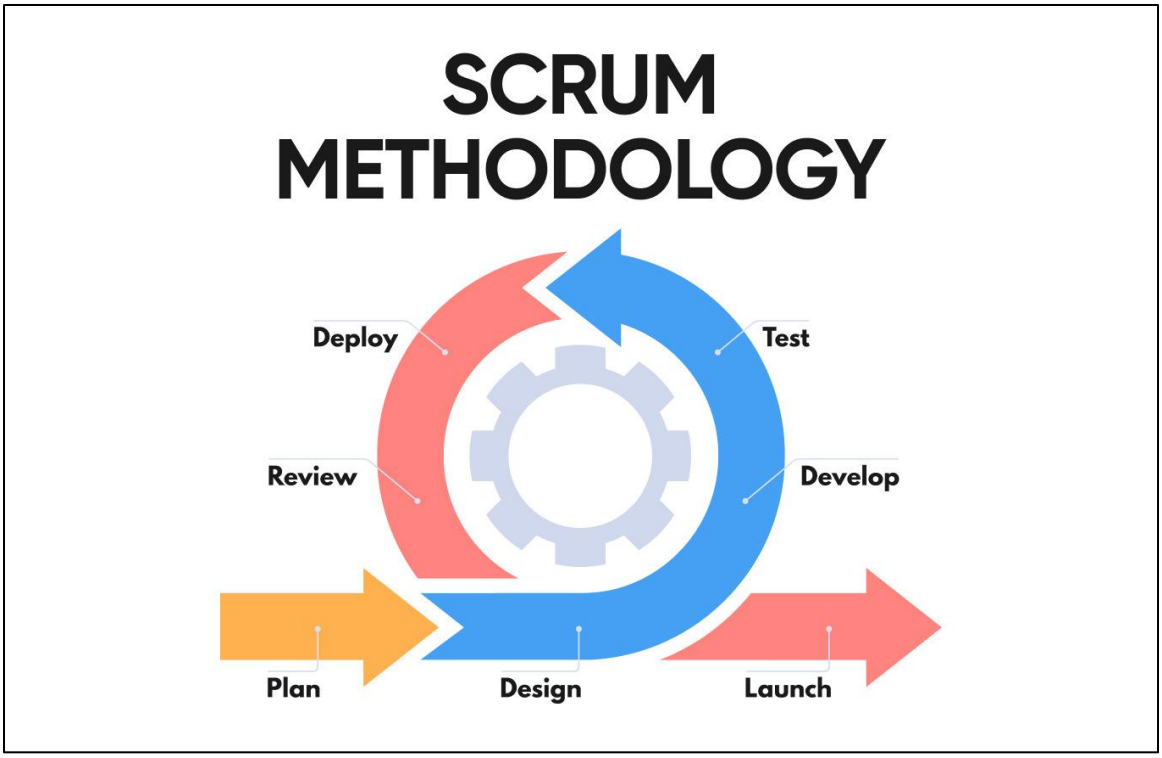

Figure 7. Agile Scrum-Based Methodology
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Planning and Requirement Gathering

Krüger (2025) defines requirement gathering as the first agile step that mainly does two things, the first being that user needs are identified through collaborative discussions and user stories and the second is done continuously. The phase is applied to the case where requirements can change along with the development cycle. Stakeholders' continuous feedback in the iteration is to help the product being developed to meet the expectations.

In the planning and requirement gathering phase, the developers will gather insights regarding the current problems faced by the expected users of the system. Furthermore, benchmarking already existing solutions should also be done to

determine the gaps and help define the scope and coverage of the new system. Upon gathering enough information, the developers will brainstorm altogether to build an initial draft about the proposed system.

System Design

Roch et al. (2022) stated system design is where business requirements are interpreted and transformed into the technical specifications of the system. To illustrate, the stages are the ones in charge of creating the end user's interface, the database, the data input, the data output, and eventually, the reporting functionalities. The output of this phase is a system design document that the developers use as a roadmap in the construction of the system.

In this phase, the developers will dive deeper about the project specification by creating visual diagrams and user interface designs that meet the needs and expectations of the target users. Generally, this stage allows developers to envision the interface and functionality of the system.

System Development

According to Linh (2024), system development is the phase where the creation of IT systems that address the problem and needs specified are given solutions. In the Scrum framework, this process is broken into sprints, a time-boxed period, which moves onto a new sprint after completion of a previous sprint. Developers can identify areas of improvement through customer feedback and improve the quality of the system.

At this phase, the developers will deconstruct the system into smaller, manageable sprints to simplify the development process. Developers will be focusing on one major feature at a time which will be developed in each sprint. This allows the team to concentrate on specific functionalities. The modular approach will support the system in getting its shape and guarantee quality and accuracy in each of its steps.

Testing and Debugging

Wyborn and Wyborn (2024) explained that the testing phase evaluates a system's capability, while the debugging phase focuses on identifying, analyzing, and correcting errors within the system. In this phase, the developers check if the system runs smoothly and identify the discrepancies between the actual and expected outputs. After testing the system, developers focus on providing solutions to errors found while running the system.

In this phase, developers will perform various tests to ensure the system runs smoothly and to detect errors early. The developers will list the identified errors and improvements that need to be made, and continue debugging the system before running more tests to ensure the system's functionality.

Deployment

As defined by Kalariya (2024), the deployment phase is the last step in the SDLC where the system is moved from the development environment to the real-world environment so that users can use it. After undergoing tests and debugging

errors, the developed system will be deployed and made available to users in the organization's environment.

The developers will coordinate with the client and set up the system for deployment. After a confirmation is given, the system will be deployed to a portion of its target users. This will allow the developers to gather user feedback before a full-scale launch.

System Review

As per Donato (2023), the review phase takes place after system deployment and involves evaluating which features were successful, identifying areas for improvement, and planning next steps based on customer feedback and team insights. This phase often leads back into the design, development, and testing stages.

After the deployment phase, reviews and insights will be collected from the users and the team, which will help the developers identify the problems and features that need to be improved. After collection, the developers will proceed to the design phase, development phase, and testing phase again to implement the changes.

System Launch

Based on Usman (2024), the release phase is the final Scrum methodology phase, which involves handing off all the deliverables to the appropriate stakeholders. While Scrum emphasizes that each iteration should be potentially

shippable, the goal is to refine and enhance the product as much as possible before its final release.

In this phase, the developers will prepare all necessary credentials, documentation, and source code for turnover to the organization. Once the system is finalized and approved, the official handover will take place, ensuring the organization has full access and control over the deployed system.

Gantt Chart

Grant (2024) defined Gantt charts as a graphical depiction of a project's schedule, which shows the start and end dates of project elements such as planning, documentation, and development. It helps in scheduling, managing, and monitoring project tasks by presenting a visual timeline in the form of a bar chart. Gantt charts are an effective way to ensure that the development of the project is completed within the given time frame.

	Ongoing																				
	Accomplished																				
					January		February				March				April				May		
No.	Task Name	Start Date	Date Finished	Duration	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17
1	Planning and Requirements Gathering																				
1.1	Conceptualizing	January 27, 2025	January 31, 2025	4																	
1.2	Planning	February 04, 2025	February 10, 2025	6																	
1.3	Data Gathering	February 14, 2025	February 18, 2025	4																	
2	System Design																				
2.1	Documentation																				
2.1.1	Chapter 1	February 19, 2025	February 26, 2025	7																	
2.1.2	Chapter 2	April 02, 2025	April 08, 2025	6																	
2.1.3	Chapter 3	April 14, 2025	April 21, 2025	7																	
2.2	Database Design	April 14, 2025	April 16, 2025	2																	
2.3	Software Design	April 21, 2025	April 23, 2025	2																	
3	System Development																				
3.1	Login Module	April 23, 2025	April 24, 2025	1																	
3.2	Scholar Management Module	April 24, 2025	April 25, 2025	1																	
3.3	Post Management	April 28, 2025	April 30, 2025	2																	
3.4	Dashboard Module	May 02, 2025	May 05, 2025	3																	
3.5	Scholar Feed Module	May 05, 2025	May 06, 2025	1																	
3.6	RFID Logging Module	May 06, 2025	May 07, 2025	1																	
3.7	Notification Module	May 09, 2025	Ongoing																		
3.8	Report Generation Module																				
4	Testing and Debugging																				
4.1	Unit Testing																				
4.2	Integration Testing																				
4.3	System Testing																				
4.4	Performance Testing																				

Figure 8. Gantt Chart

Figure 8 from previous page presents the Gantt Chart for ISCO system development, enumerating the major phases namely Planning and Requirements Gathering, System Design, System Development, and Testing and Debugging, the project started on January 27, 2025, with conceptualizing, planning, and data gathering. At this point, the developers have visualized how the final output will turn out.

On February 19, 2025, the system design phase began. It started with the documentation of Chapters 1 to 3. It is then followed by database design and software design, from April 14, 2025 to April 23, 2025.

Once the design is finished, the System Development started on April 23, 2025 with the Login Module followed by Scholar Management Module, Post Management Module, Dashboard Module, Scholar Feed Module, RFID Logging Module that ended on May 7, 2025. The development of Notification Module has started and still ongoing. However, the developer declared a system development pause on May 12, 2025 and will resume in the next semester.

Operation and Testing Procedure

This section discussed the operation and testing procedure of the ISCO system. The test is done through different procedures such as unit testing, integration testing, system testing and acceptance testing.

Operation Procedure

The ISCO system has a total of three target users, namely, the admins, officers and scholars. The admins will operate the ISCO system via a Web

Application, while the officers on a Desktop Application and the scholars on an Android Application.

Before accessing the system, the assigned super admin will login and register admin accounts and officer accounts of each locality. The admin can then register scholar accounts through the Scholar Management Module and give the credentials to the scholars. Each end users can then authenticate their accounts using the Login Module. After a successful login, the users will be able to proceed with their corresponding section of the system.

Through the Dashboard Module, the admins are provided a one-look view about key metrics of the Iskolar ng Bataan. The admins can then navigate to the Post Management Module to be able to post either an activity or an announcement for the scholars to view. Similarly, the officers can also post either an activity or an announcement on a municipal-level.

Once posted, the scholars will be notified through the Notification Module, and be able to view the activities and announcements via the Scholar Feed Module. On the scheduled date of the activity, the officers can facilitate the scholars' compliance with the RFID Logging Module. A scholar will be marked complied when their personal RFID cards are scanned. The compliance status for the activity will then be reflected back to the Scholar Feed Module.

All compliance records can then be used by the admin to generate reports through the Report Generation Module.

Testing Procedure

1. Unit Testing

As stated by Bakharev (2025), Unit Testing is a software testing method by which one is dealing with single components of a software program in isolation, to ensure that each unit of the software performs as intended and meets requirements. Developers can detect and correct the bugs that might have been written during the development phase of the project and enhance the reliability of the code.

Throughout system development, unit testing was practiced to ensure that each individual module is working according to its specifications. It enables developers to find and fix system errors easily. The software was consistently being built, tested, and improved until wanted outcomes were achieved.

2. Integration Testing

According to Zaidi (2024), integration testing is the phase of software testing which ensure that the operations performed between integrated units or modules are as expected. The testing of integration is also a tool used for detecting interface defects, communication problems, and data flow issues among components that were not discovered during unit testing. Moreover, this testing procedure confirms that the system's overall functionality and reliability are still efficient and effective when the system is combined with other parts.

Integration testing was conducted for system development to guarantee that when combined modules were interacting the way they were supposed to.

Integration testing allows the developers to locate interface defects, communication issues, and data flow problems which have been overlooked during unit testing. The testing confirmed that the system was still efficient and reliable after all the components had been interconnected.

3. System Testing

Yasar and Black (2023) referred to system testing as the process where the quality assurance team evaluates how all components and features interact within the fully integrated system. It focuses on validating the system's compliance with functional and non-functional requirements, such as performance, usability, and security. System testing verifies if the system meets the specified requirements and is suitable for launch to end-users.

In this process, the developers will check and test the whole system. The testing will be done by following the step-by-step process of the web application like an intended admin or super admin, the desktop application like an intended officer, and the Android application like an intended scholar.

4. Acceptance Testing

Gillis (2024) explains that acceptance testing is the process of determining how well a system meets the client's expectations. It is conducted by the quality assurance team to ensure that the software aligns with client requirements and user needs. This phase also involves direct interaction with users, allowing the team to gather valuable feedback for final adjustments.

In the acceptance testing, the developers can check whether the system meets the requirements. This test will determine how inline the system is with the objectives. The developers can gather user feedback and provide needed adjustments.

These testing procedures will utilize the test script form below.

Table 4. Test Script Form

Date			
Tested By			
Test Case Number			
Test Case Name			
Test Case Description			
Item(s) to be tested			
Procedural Steps			
Specifications			
Input	**Expected Output/Result**	**Pass Y/N**	**Actual Result/Output**

Evaluation Procedure

These are the listed activities that the developers will perform during the project evaluation:

1. The concept and operation of the system will be discussed to the respondents.
2. The system will be setup in a testing environment.

3. The evaluation form will be distributed to the respondents.
4. The system will be tested based on ISO 25010 criteria, specifically in terms of functional suitability, efficiency, usability and security.
5. The proponents will gather the evaluation forms from the respondents and will analyze the collected data.
6. The data will be computed using the weighted formula.
7. The overall rating will be interpreted using the numerical scale and equivalent descriptive interpretation using the Likert scale.

Table 5. Likert's Scale

Rank	Numerical Scale	Interpretation
5	4.51 – 5.00	Highly Acceptable
4	3.51 – 4.50	Very Acceptable
3	2.51 – 3.50	Acceptable
2	1.51 – 2.50	Moderately Acceptable
1	1.00 – 1.50	Not Acceptable