



**ILOCOS SUR POLYTECHNIC STATE COLLEGE**  
**Sta. Maria Campus, Sta. Maria, Ilocos Sur**

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**E-VOTING SYSTEM FOR ISPSC SANTA MARIA**

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## **Chapter 1**

### **INTRODUCTION**

#### **Background of the Study**

Education both includes both the act of sharing knowledge with others and the process of learning something new. It also has the potential to benefit society as a whole. It creates a society where people are informed of their obligations and rights. A part of the education system is the organization of student bodies to represent the studentry on a campus. Moreover, in such, state universities and colleges conduct elections.

Student government is a group of students overseeing various school-related tasks, programs, projects, rules, and ideas. The student body elects the leaders who give the highest levels of leadership, much like in other types of government. Members who have been elected may appoint others. The student government has the primary responsibility of bringing the concerns of student voters before the school authorities, carrying out the honorable duty of ensuring the well-being of the entire student body, (Eastern Nazarene College, 2021).

Llanos et al. (2019) stated that in Columbian Universities, the Electronic Voting System "EVS" is based on Law 892 of 2004 on the Electoral Process. This solution implements the voter registration process with each formula, voter, and jury. It also implements electronic voting processes and generates reports with results. Various algorithms implemented in EVS mitigated the risk of attacks on the election process and the data stored in the database engine. EVS, which is deployed on two of Colombia's three university campuses, proposed a voting process. EVS automatically completed the voting process at the specified time and deactivate all selected





computers. The results were reported after the election, but it took about 30 seconds to apply.

A study by Affandi (2019) found that electronic voting procedures or student voting systems could be used as alternatives when choosing student organizations. It makes a very effective and efficient contribution, both materially and morally. This could make the election process more interesting and innovative. This student council election system with an electronic voting system facilitates the student council election process, provides accurate, fast, and reliable voting results, reduces the number of students who do not vote, and does not affect the learning process.

Abraham (2020) presented the possibility of voting anywhere there is an internet connection. By developing a computerized voting system that saves effort, money, and time instead of easing school lessons, every student can vote. Furthermore, a study by Hjalmarsson (2018) stated that building a secure electronic voting system could not only provide privacy and fairness to current voting systems but also provide flexibility and transparency. The purpose of a blockchain-based electronic voting system is to remove the limitations of existing systems and validate popular blockchain frameworks. Abu-Shabab (2022) pointed out the advantages of voting machines in the electoral process. Key benefits of electronic voting include more participation and voting options, reduced costs, improved vote placement and speed and accuracy of tallying, and greater flexibility and accessibility.

Meanwhile, Ilocos Sur Polytechnic State College is one of the largest schools in the province of Ilocos Sur, having a massive number of students who have the right to choose and elect their preferred leaders who will represent them on the board. The elected officer's council will lead the students to become better students by giving them



various opportunities to develop their leadership knowledge, skills, abilities, and attitudes. It will also create the foundation for excellent government, volunteerism, unity, and cooperation.

Before the pandemic hit the country, the election process in ISPSC was administered manually. In this setup, counting the total results of votes is rigorous and prone to human error as it is done manually. During the height of the pandemic, the elections were conducted online through Google Forms. In this type of election, students must register, which includes their name and student ID number, to receive their One-Time Pin (OTP).

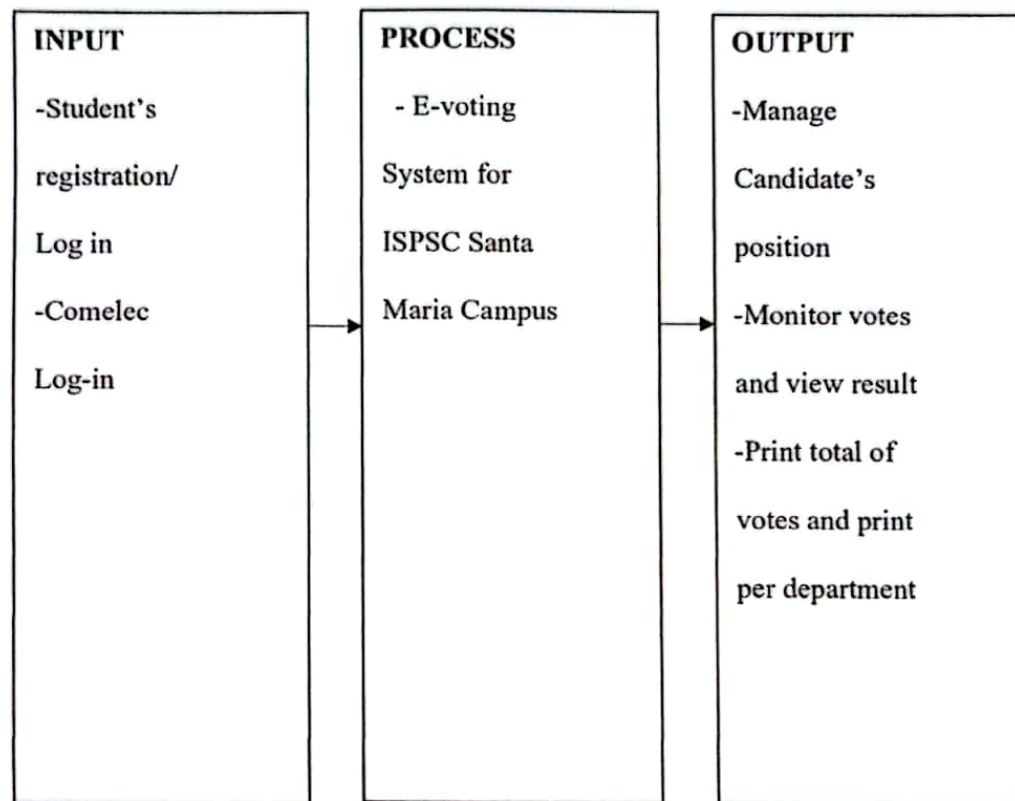
This OTP will serve as the key to voting for the actual election. With the current setup, students may take advantage of the imperfect voting system, considering it is prone to abuse and misuse, and its credibility might be at stake. Under school policies, the candidate or the team who did such malicious things during the election should be disqualified. Moreover, some students encountered problems regarding receiving of OTPs. The previous and current processes used in the voting election may challenge the validity and accuracy of the votes, and the outcome may be prone to errors. Therefore, it is evident that a more effective method is necessary for conducting student elections.

The purpose of this study was to modernize the voting process and leverage technology to improve efficiency, accessibility, and transparency in elections and design an e-voting system to be implemented and used in the ISPSC Santa Maria campus to minimize errors, reduce invalid votes and voters, enhance transparency, auditability, and to secure the veracity and reliability of the result, the effectiveness and efficiency of work, and the protection of the student privacy.



### Conceptual Framework of the Study

Figure 1 shows the conceptual framework of the study. It will serve as the outline for the conduct of the study.



**Figure 1. Conceptual Framework of the Study**

In the conceptual framework, the input of a voter could use their voting right online without any difficulty. There were three user levels on the system, first, the admin, second the comelec, and lastly, the students or voters. The process stated that the project founded and created to replace the existing manual voting system of ISPSC Sta. Maria campus that produced inconvenience not only to the voters but also to the election of the committee. And lastly, the output of the admin could manage the





candidate's position, monitor votes, view results, print the total of votes, and print per department.

### **Objectives of the Study**

This study aims to design and develop an e-voting system for Ilocos Sur Polytechnic State College to cast votes for student organizations' elections. The proposed system can significantly reduce the workload and provide an accurate record of votes. Specifically, this study aims to:

1. To describe the current process and identify the existing problems in the student organization election in terms of:
  - a. Registration
  - b. Canvassing
  - c. Reporting
2. To identify the functional and non-functional requirements needed in the development of the e-voting system for ISPSC Santa Maria Campus.
3. To evaluate the acceptability of the developed system.

### **Scope and Limitation of the Study**

The system was exclusively for Santa Maria Main Campus. It covered the process of voting for deserving candidates. The voters can access the system online. The voter first would have to register to be able to vote for the current election. During the registration, the admin would have to input the CSV file account first for the voter to access the system, and the admin must distribute the generated unique codes of each student. The students must enter their Student ID number and unique code. They can only vote once, and after submitting the votes, the students can use the "view my ballot" and "view votes' turnout" option to see their ballot and also the partial and unofficial





results. Votes will automatically be recorded in the system. The system will utilize the real-time status of votes. The admin can only access the system to update and edit the profile of candidates, the COMELEC can also monitor the number of votes. The system can be used on any local server and accessed as a cloud-based.

The system cannot predict who will win the election. It will not record any vote unless the voter is enrolled for the current semester. For the voter's privacy, the system will ensure that their votes will not be traced back to them. Only the number of votes will be shown.

### **Importance of the Study**

The study was beneficial for the following:

The **Organization of School Administrators and Supervisors (OSAS) Director** can easily monitor, add, edit, and delete the candidate's information and check the results per department and responses based on the information provided by the users, and they will know the results of the votes.

The **Comelec** can also easily monitor the voters and view the results but cannot add, edit, or delete the candidates.

The **Faculty** can be benefited from this study to lessen the work of the faculty in terms of assisting the students in registration and providing information about the e-voting system.

The **Researchers** will enhance their knowledge and skills in developing web-based applications.



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**Future researchers** can use the results of this study in developing and implementing web-based applications considering other systems. Optimal user interfaces are created and integrated into the system to enable efficient data flow.



## **Chapter 2**

### **METHODOLOGY**

#### **Research Design**

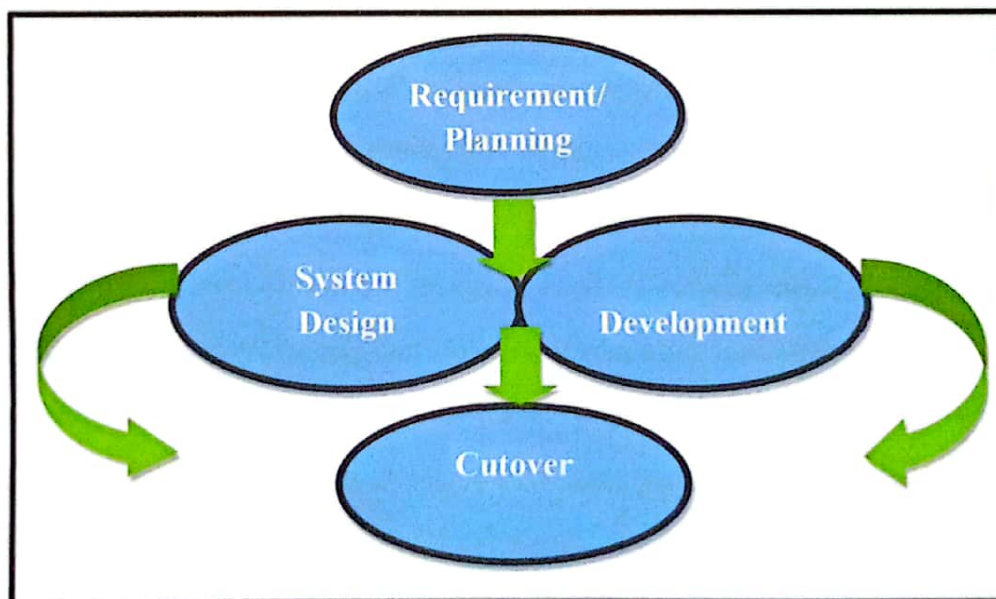
The researchers used a descriptive development design to organize the interpretation, presentation, and prescription of the data. Descriptive development design refers to a design approach that focuses on describing the development process in detail. It involves documenting and articulating the steps, activities, and decisions involved in the development of a product, system, or project. Descriptive development design refers to a design approach that focuses on describing the development process in detail. It involves documenting and articulating the steps, activities, and decisions involved in the development of a product, system, or project. With the help of this research design, the researcher had a better understanding of the clear process of election from the academic year 2022 to 2023 which identifies the cause and effect of manual election and e-voting election. The researchers then formulated and developed the system through analysis, interpretation, and determining its flaws. The election requires forms to fill out and used, specifically in observing the practices and policies on the ISPSC Santa Maria campus and examining documents. This approach is used to collect data, which will then be evaluated, interpreted, and integrated into the suggested system. Different software packages and programming languages that were appropriate for the system were also found. The optimum user interface will be built and incorporated into the system to enable efficient data flow.

#### **Software Model**

In this project, the proponents adapted Rapid Application Development (RAD) method by Dilts (2018) to develop and design an e-voting System for Elections in



Ilocos Sur Polytechnic State College Sta. Maria. Rapid Application Development (RAD) is an iterative software development approach that focuses on quickly delivering functional software through short development cycles called iterations or sprints. RAD emphasizes collaboration between developers, users, and stakeholders throughout the development process. In a RAD model, the development team collaborates closely with stakeholders, such as clients or end-users, to gather requirements and create an initial prototype. Based on the feedback received, subsequent iterations of the software are developed, integrating the suggested changes and improvements. RAD models typically involve the use of visual development tools and techniques, enabling developers to quickly build user interfaces and connect them to underlying business logic.



**Figure 2. Rapid Application Development Model**

The four phases that will be used to implement Rapid Application Development (RAD) are as follows:





**Requirements planning phase-** This phase involves gathering and documenting the project requirements through workshops, interviews, and discussions with clients. The focus is on identifying the essential features and functionalities needed in the application. In this phase, development planning should be designed based on the information available from different activities. The proponents conducted a casual interview with the current SSC President, the Former ITSS President in their offices, and the Director of Student affairs. In this phase, the developers and team members communicate to determine the goals and expectations for the project as well as current and potential issues that would need to be addressed during the build. This phase is done by researching the current problem, defining the requirements for the project, and finalizing the requirements with each stakeholder's approval.

**System design phase-** During this phase, the development team works closely with end-users and stakeholders to create mockups, prototypes, or wireframes that represent the user interface and key functionalities of the application. The emphasis is on achieving a clear understanding of user needs and expectations. The Developer and team member's work hand in hand to ensure the needs are being met at every step in the design process. All the bugs and kinks are worked out in an iterative process. The developer designs a prototype, the team members test it, the proponents use Sublime text software and Bootstrap in designing the system, and then the proponents come together to communicate what works and what was not, and regular consultation with the Capstone Adviser.

**Development phase –** In this phase, the proponents are doing revisions and developing the system. The developer and testers work together to make sure everything is working fine and smoothly, and that the result satisfies the user's



expectations and objectives. Preparation for development, system development, coding, and system testing is done in this phase.

**Cutover phase-** It requires careful planning, coordination, and attention to detail to minimize disruption and ensure a smooth transition. It is an essential part of project implementation to ensure the success of the new system or process. This phase is where the finished product is launched. All final changes are made while the coders and team members continue looking for system bugs.

### Project Plan

This figure illustrates a timeline employed as the method of project management to depict the status of the E-voting system process for ISPSC Sta. Maria shows the order and duration of the four phases of the Rapid Application Development (RAD) Model. RAD emphasizes flexibility and adaptability, allowing for adjustments throughout the project lifecycle to ensure rapid development and delivery of software.

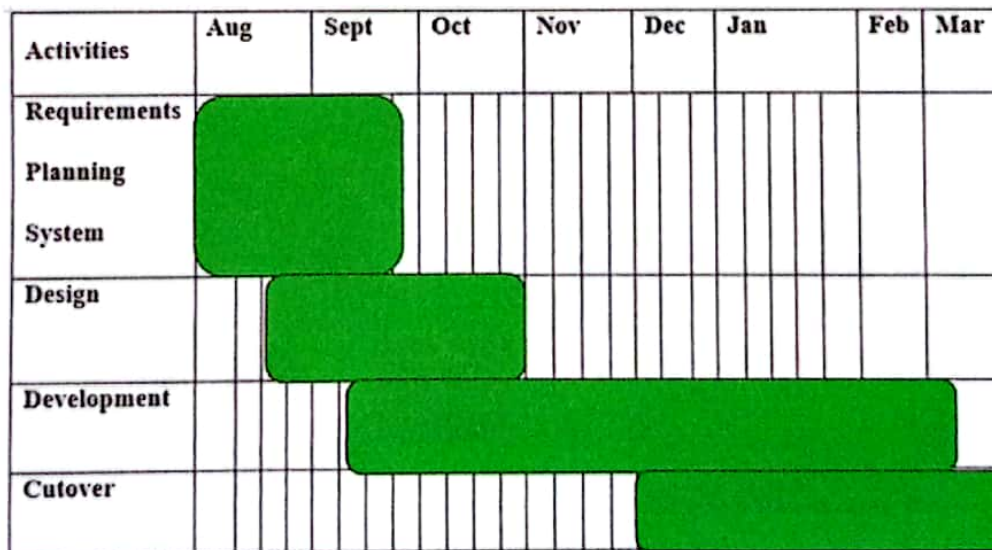


Figure 3. Project Schedule



### Project Assignments

The roles and responsibilities of team members within the proposed system  
“E-Voting system for ISPSC Sta. Maria”.

<b>Roles</b>	<b>Names</b>	<b>Functions</b>
Project Manager	<b>Karen R. Macalino</b>	<ul style="list-style-type: none"><li>• Responsible for coordinating with the project team.</li><li>• Maintain open communications with all the members</li></ul>
System Analyst	<b>Noreen R. Laigo</b> <b>Michael Angelo A. Nido</b> <b>Alanis Armela D. Directo</b>	<ul style="list-style-type: none"><li>• Coordinates the technical team's efforts in resolving challenges and ensuring that solutions are practical and consistent.</li></ul>
Software Engineer/Developer	<b>Karen R. Macalino</b>	<ul style="list-style-type: none"><li>• Responsible for managing the systems planning design team and building the project.</li></ul>
QA/Tester	<b>Lily Jane D. Abboc</b> <b>Joan P. Despogado</b>	<ul style="list-style-type: none"><li>• Responsible for checking the debugging queries of the project.</li><li>• Evaluate software needs and communicate findings to the project team.</li></ul>
Writer/Researcher	<b>Lily Jane D. Abboc</b> <b>Joan P. Despogado</b>	<ul style="list-style-type: none"><li>• A status report on the whole project.</li><li>• Publish the project plan timeline and project requirement sheet.</li></ul>

**Figure 4. Project Assignment**





### Population and Locale of the Study

The respondents of the study were the Committee on Election, IT Experts, and Students or Voters of ISPSC Sta. Maria, Ilocos Sur consisting of 353 students (CBME-119, CCS- 91, CAFED-94, and CTE-40) enrolled during the academic 2022-2023, and three (3) IT Experts of Ilocos Sur Polytechnic State College Santa Maria Campus. The respondents were selected utilizing Slovin's formula. N represents the total population of the respondents.

Table 1 shows the distribution of the selected respondents to participate in the Acceptability of the proposed system.

Respondents	N
IT Experts	3
CBME	119
CCS	91
CAFED	94
CTE	49
Total	353

**Table 1. Distribution of Respondents**

### Research Instrument

Interview, observation, and surveyed questionnaires are the tools that used in the study, which also involved the students in the different departments and the committee on election of Ilocos Sur Polytechnic State College, where the proposed system had been implemented.





Interview - The proponents conducted an interview at Ilocos Sur Polytechnic State College, Santa Maria, Ilocos Sur. An interview guide was created by the person in charge of the project to gather important information as evidence for the development of this project.

Observation - Based on the proponents' observations, the voting and counting of votes during pre-pandemic were manually using forms to be issued. In post-pandemic, they used Google forms to vote using the ID number of the students.

### **Data Analysis**

Mean and frequency count, and the following indicators, eased of used, satisfaction, usefulness, and eased of learned, was required to treat the required data to determine the usability of the proposed system e-voting system for ISPSC sta. Maria.

The following statistical limits will be used in quantifying the data gathered in the study:

<b>Point Value</b>	<b>Mean Range</b>	<b>Descriptive Rating</b>	<b>Descriptive Interpretation</b>
5	4.21-5.00	Strongly Agree	Very Highly Acceptable
4	3.41-4.20	Moderately Agree	Highly Acceptable
3	2.61-3.40	Neutral	Moderately Acceptable
2	1.81-2.60	Moderately Disagree	Slightly Acceptable
1	1.00-1.80	Strongly Disagree	Not Acceptable

**Table 2. Descriptive Interpretation on the Level of Acceptability of e-Voting system for ISPSC Sta. Maria**



The data gathered were categorized from Not Acceptable to Very Highly Acceptable. Mean ranges from 1.00-1.80 described as Strongly Disagree and interpreted as Not Acceptable, 1.81-2.60 described as Moderately Disagree and interpreted as Slightly Acceptable, 2.61-3.40 described as Neutral and interpreted as moderately acceptable, 3.41-4.20 described as Moderately Agree and interpreted as Highly Acceptable, and 4.21-5.00 described as Strongly Agree and interpreted as Very Highly Acceptable.



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