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# Web App Voting System in a Philippine State University: An ISO 9241-11 Evaluation

**Jessie Richie N. de los Santos[1(corresponding author)], Michael B. Batan[2], Giovanni N. de los Santos[3], Michelle G. de los Santos[4]**
[1]Information Technology Faculty, Eastern Visayas State University – Tanauan Campus, Philippines;
jessierichie.delossantos@evsu.edu.ph
[2]Head, Student Services Department, Eastern Visayas State University – Tanauan Campus, Philippines;
michael.batan@evsu.edu.ph
[3]Information Technology Faculty, Eastern Visayas State University, Philippines;
giovanni.delossantos@evsu.edu.ph
[4]Registration Officer, Philippine Statistics Authority – Regional Office 8, Philippines;
michellegalangue@gmail.com

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## ABSTRACT

Fourth Industrial REvolution offers various technological innovations that contribute significant advantages to the university. The development of the web app voting system (WAVS) in Eastern Visayas State University - Tanauan Campus transformed the voting experience of university students. The study aimed to determine the extent of usability of the WAVS in the Supreme Student Government election. A total of 203 students (voters) served as the respondents using a convenient sampling technique. A descriptive quantitative research design was employed to present the respondents' views and opinions. The study revealed the system evaluation to be "Excellent" in all factors of usability components on effectiveness (3.50), efficiency (3.43), and user satisfaction (3.42) with a grand mean of 3.45. The WAVS exceeded the users' requirements on the context of use principles allowing them to perform their tasks efficiently and effectively. The results of the study present an interesting direction of the system implementation across campuses of the university. Developers should consider the mobility of system connectivity using a secured virtual private network (VPN) of the university. Implement security measures on voter's identity and network firewall encryption. Finally, developers of the system should always consider the usability principles and user requirements in developing an effective and efficient information system.

**Keywords**: state university; web app, voting system, Fourth Industrial Revolution, ISO 9241-11

## INTRODUCTION

### Background

Today's fourth industrial revolution (FIRE) brings forth technological advancements and significant benefits to people in remarkable ways. This various development on system innovation among universities in the Philippines makes things easier and faster and therefore contributes greatly to the delivery of transactions and services more effectively and efficiently [(1,2)].

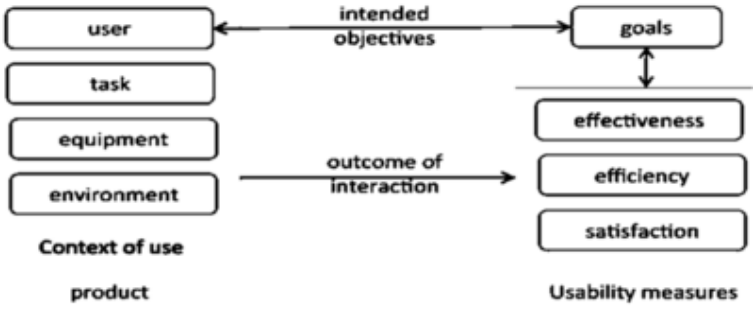


Figure 1. ISO 9241-11 Usability Framework[(9)]

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The development of the web app voting system in Eastern Visayas State University – Tanauan Campus (EVSUTC) is one of the promising system innovations in the university. The system transformed the students' voting experiences in the university. It eliminates the tedious and repetitive tasks of manually counting casted ballots during the Supreme Student Government (SSG) election [3-5].

The web app voting system offers accuracy and removes ambiguities that are present in the paper-based election. The system provides a secure and reliable election activity in the university [6]. The system offers access to a variety of computing devices due to its web-based platform [7,8].

The ISO 9241-11 provides a quantitative standard evaluation instrument (see. Figure 1) on the software usability of the developed system based on the users' views and opinions[9]. It intends to measure system effectiveness, efficiency, and user satisfaction [10,]. This will help developers to develop systems that meet user needs and perform specific tasks that attain system effectiveness, efficiency, and users' satisfaction [11,12].

In the context of use, the system is evaluated on the type of users the level of technical know-how, tasks needed to perform, device or equipment used to perform the tasks, and the nature of the environment where the system is implemented [11,9]. The system or product is evaluated based on how the goals were achieved on its effectiveness, efficiency, and satisfaction of the user. Therefore, system usability indicates how users learn and use the system without difficulty while making sure that the goals are achieved [10].

The system usability has been an utmost concern to both students (voters) and the faculty involved in the election activities of the university. The need to call for a clean and transparent election in choosing their student leaders in the university is an opportunity for system automation [6, 14].

Despite the popularity of the voting system in the Philippine State University and on several works of literature, there is still a dearth of studies using ISO 9241-11 to evaluate system usability based on the users' views and opinions. Thus, this study aims to contribute to the new body of knowledge on the fourth industrial revolution on system innovation utilizing ISO 9241-11 or Software Usability Standard Evaluation.

### Objectives

This study aimed to determine the usability evaluation of the web app voting system in Eastern Visayas State University – Tanauan Campus, Tanauan, Leyte for the Supreme Student Government election. Specifically, the study aimed to determine the level of the respondents' usability evaluation based on ISO 9241-11 components such as System Effectiveness, Efficiency, and User Satisfaction.

## METHODS

### Research Design

This quantitative study employed the descriptive research design since this approach tend to describe and measure the problem under study [15]. The design was appropriate in the study to describe and evaluate the usability of the web app voting system according to its effectiveness, efficiency, and user satisfaction.

### Sampling Design and Respondents

The non-probability sampling design using convenient sampling method was adopted in the study selection of samples [16]. There were 203 students out of 2010 from the first semester of the school year 2019 to 2020 who responded in the survey after casting their votes on the conduct of the Supreme Student Government 2019 election.

### Research Instrument

An adapted research instrument on ISO 9241-11 from Assila, Oliveira, and Ezzedine (2016) was used in the conduct of the study [17]. The questionnaire contains the two (2) salient parts: 1) profile of the respondents and; 2) the system evaluation on the following components on Effectiveness, Efficiency and User Satisfaction in a 4-point Likert scale ranging from Poor to Excellent [17,18,19].

### Ethical Consideration

The study was submitted to the Office of Planning, Research Development, and Extension Services (OPRDExS) of the University and was approved as an institutional research activity. The study has no observed potential benefits or hazards to the respondents who took part in the system evaluation. The researchers secure

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written informed consent from respondents on their rights to participate in the study and personally distribute the survey questionnaires to the respondents. Safekeeping of the documents were strictly observed to ensure confidentiality of data [15]. The protocol of the study was submitted and approved by the EVSU Tanauan Campus Ethics Review Committee.

**Treatment of Data**

Researchers utilized a spreadsheet application program (MS Excel) in collating responses from the questionnaires. Descriptive statistics were such as percentage, mean, and standard deviation were used for data analysis on the system effectiveness, efficiency, and user satisfaction using the IBM SPSS application [20].

## RESULTS

Table 1: Results on the demographic profile of the respondents

| Age | Frequency | Percentage |
|---|---|---|
| 30 years old and above | 5 | 2.5 2.46 |
| 27 – 29 years old | 6 | 3.0 2.96 |
| 24 – 26 years old | 17 | 8.4 8.37 |
| 21 – 23 years old | 59 | 29.0 29.06 |
| 20 years old and below | 116 | 57.1 57.14 |
| Sex | | |
| Female | 118 | 58.13 |
| Male | 85 | 41.87 |
| Year level | | |
| 5th year | 30 | 14.78 |
| 4th year | 20 | 9.85 |
| 3rd year | 15 | 7.39 |
| 2nd year | 70 | 34.48 |
| 1st year | 68 | 33.50 |

Table 2. System ISO 9241-11 evaluation

| ISO 9241-11 | WM |
|---|---|
| Effectiveness | 3.50 |
| Efficiency | 3.43 |
| User satisfaction | 3.42 |
| Grand mean | 3.45 |

Notes: 1.00 – 1.60 Poor; 1.61 – 2.40 Fair; 2.41 – 3.20 Good; 3.21 – 4.00 Excellent

Table 3. System usability evaluation: effectiveness

| Indicator | WM | Interpretation |
|---|---|---|
| I can perform the tasks in a straight-forward manner. | 3.488 | Excellent |
| I can effectively complete my tasks using this system. | 3.586 | Excellent |
| I can use the system using secured access to data. | 3.527 | Excellent |
| I can use it successfully every time. | 3.409 | Excellent |
| I can perform more tasks using this system. | 3.468 | Excellent |
| Overall mean | 3.496 | Excellent |

Table 4. System usability evaluation: efficiency

| Indicator | WM | Interpretation |
|---|---|---|
| The system can respond quickly in completing specific task. | 3.478 | Excellent |
| The system is easy to use in specific task. | 3.488 | Excellent |
| The system provides real time generated of reports. | 3.424 | Excellent |
| This system helps me perform my tasks more efficiently. | 3.320 | Excellent |
| The system is reliable and error free. | 3.458 | Excellent |
| Overall mean | 3.433 | Excellent |

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Table 5. System usability evaluation: user satisfaction

| Indicator | WM | Interpretation |
|---|---|---|
| The system provides best user experience in completing tasks. | 3.438 | Excellent |
| The user learns to use the system easily. | 3.502 | Excellent |
| The system design is compatible across devices. | 3.286 | Excellent |
| The user uses the system without much effort. | 3.414 | Excellent |
| The user is satisfied in using the system. | 3.473 | Excellent |
| Overall mean | 3.423 | Excellent |

## DISCUSSION

The unique offering of system automation in State Universities offers a competitive advantage for a transparent, effective, and efficient services to its stakeholders [1,3,8]. The development of Web App Voting System answers the call of university students for a clean and transparent election using information system automation. The majority of the respondents are on the age group of 18-20 years old, coming from 2nd-year level and the majority are female students.

The System was evaluated based on the ISO 9241-11 components on its Effectiveness (3.50), Efficiency (3.43), and User Satisfaction (3.42) which attained a grand mean of 3.45 interpreted as "Excellent". The web app voting system achieved the principles of the context of use product and usability measures. The user must be steadfast in accomplishing a certain task using particular equipment in a productive environment. To note, the majority of the respondents in EVSU Tanauan Campus were extremely delighted in using the Web App Voting System.

Experts mentioned System Effectiveness, allow users to consistently accomplish their specific tasks [6,10,21]. Using the system, the respondents claim that they can effectively complete their tasks in casting votes with a weighted mean of 3.50 interpreted as "Excellent".

Supported by recent studies, System Efficiency is further measured on the number of time users to complete their tasks. The system automation change dynamics of the students voting experience in the university [6,22]. The increasing number of students involved in the election process is highly commendable. Based on the results of the study, the respondent's system evaluation was unanimous that the system is easy to use in casting their votes.

User Satisfaction is a subjective assessment of his voting experience in the system. The system provides a dashboard to review voters' ballots before being cast into the system. The provision of user prompts is adequately available to make the voting experience more interactive and satisfying [6,23,24].

With the system designed mobility, web-app technology allows the system to be compatible across computing devices [1,8,31]. Users are empowered in learning to use of system easily without difficulty in accomplishing specific tasks to be effective and proven efficient as supported by several works of literature on information system development [9,20-26].

Automation of certain processes in State Universities offers substantial benefits to the community stakeholders. Researchers mentioned the major contribution of information systems in the organization such as a secured system for data access, an effective and reliable information system, provided transparency in every transaction, enhances decision making, and better delivery of services to its stakeholders [27, 28, 29, 31]. These system innovations bring significant change to the user's experience and provided optimal use of organizational resources [3,6,28,29].

Finally, the result of the study revealed that the web app voting system has been evaluated consistently to be an excellent information system designed specifically for the Supreme Student Government election purpose in the university. Supported by several pieces of literature, the WAVS allows the voting experience of students to be digitally transparent and interactive in a more secure, reliable, effective, and efficient information system capable of decision support system [6,7,13,20,30,31].

## CONCLUSION

The voting experience of the students in the university has leveled up to a new era of the fourth industrial revolution. The results of the system evaluation are highly observed to be positive across students in the university using ISO 9241-11. The system design and functionalities have matched the users' requirements

which allows them to perform their tasks efficiently and effectively without difficulty. Overall, the system has helped the university in resource management and presents an interesting direction to green initiatives.

The findings presented some areas for improvement as a basis for system development though it attains a near perfection of the system usability evaluation. The system should be able to provide distinct access privileges to manage the system more effectively and efficiently. Provide a built-in system manual that will guide the users in performing their specific tasks in the system thus contributing to a higher system user satisfaction.

The Web app voting system presents interesting directions in the possible implementation across campuses of the university. The voting system will encourage an increase in its voter's turnout rate across the university.

Future development on the voting system, the voting experience can be done in a mobile location where mobility of connectivity access is possible. Implement biometrics security for voter's identity and provide network connectivity restrictions where the system can be accessed through a virtual private network in distant university campus locations. Further, the system can be upgraded to run on cross-platform devices where software architecture is not restricted to either window, android, or Mac operating system.

Finally, developers should always consider ISO 9241-11 or the usability system components and plan out user requirements which will help achieved developing an effective and efficient information system for the university.

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