

A Computerized Touchscreen Student Voting System for the Universities and Colleges

Jeff G. Pereyras

Pangasinan State University - Lingayen Campus

Lingayen, Pangasinan, Philippines

jeff.pereyras@gmail.com

Abstract – Computerized touchscreen student voting system is a form of computer-mediated voting system in which student-voters make their selections with the aid of a touchscreen computer. The research was conducted to assess the effectiveness of the existing student voting system of the Universities and Colleges, particularly in the Pangasinan State University - Lingayen Campus, where it was taken as a sample, as a basis for proposing a computerized touchscreen student voting system. The study utilized the descriptive-developmental method of research. In gathering data needed in this study, the questionnaire-checklist, casual interview and observation techniques were resorted to. The data gathered through the questionnaire were organized and tabulated. Analysis of data was done through the use of such statistical tools as weighted mean and t-test. On the effectiveness of the existing student voting system, the existing student voting system was perceived by the student organization advisers as “Effective” and the existing student voting system was perceived by the students as “Somewhat Effective”. Findings showed also that, there is a significant difference in the respondents’ perception on the effectiveness of the existing student voting system. Further, the proposed computerized touchscreen student voting system is highly acceptable to the students. After a thorough consideration of the findings and conclusions of this study, the researcher highly recommends that the management of the different Universities and Colleges, particularly the sample University, the Pangasinan State University - Lingayen Campus, with the approval of the Students’ Affairs Office and the University Student Council adopt the proposed computerized touchscreen student voting system in the near future.

Keyword – Computerized Touchscreen Student Voting System.

INTRODUCTION

Electronic voting systems offer convenience over conventional voting techniques. An electronic voting system involved in a series of steps voting, collecting, and counting ballots. Almost all educational institutions, if not all, make provisions for students’ exercise of their right of suffrage as such activity enhances their political awareness. Thus, students are given the opportunity to elect their officers who will run the so-called “student government”.

Over the years, student elections in the Universities and Colleges, particularly in the Pangasinan State University - Lingayen Campus, where it was taken as a sample, had been carried out in the traditional way. Votes

were cast in ballots by the students; votes were canvassed and results were tallied on the board; summaries were reflected in sheets of Manila paper and were reported in typewritten or encoded form and submitted to the Students’ Affairs Office.

Obviously, the traditional student voting system was time-consuming and less economical. The researcher himself was a witness to this kind of student voting system. He felt that something can be made to develop the student voting system in the said institution; hence, he embarked on this study which attempted to propose a computerized touchscreen student voting system.

STATEMENT OF THE PROBLEM

The problem was designed to assess the effectiveness of the existing student voting system of the Universities and Colleges, particularly in the Pangasinan State University - Lingayen Campus, where it was taken as a sample, as a basis for proposing a Computerized touchscreen student voting system. Specifically, it sought to answer the following questions: What is the existing student voting system of the Pangasinan State University - Lingayen Campus and how is it perceived by Student organization advisers and Students?, Are there significant differences in the respondents' perception on the effectiveness of the existing student voting system?, What student voting system can be proposed to improve the management of elections in the Pangasinan State University - Lingayen Campus?, How acceptable is the proposed computerized touchscreen student voting system as perceived by students?.

METHODOLOGY

The study utilized the descriptive-developmental method of research. It was considered the most appropriate for the study because it focused on obtaining facts of existing conditions on student voting system of the PSU – Lingayen Campus. The primary data were taken from the two (2) groups of respondents, namely, students and student organization advisers. There were three hundred eighty six (386) students-respondents selected using sample percentage allocation per course and all the nineteen (19) recognized student organization advisers of PSU – Lingayen Campus who give their feedback on the given questionnaire-checklist. In gathering data needed in this study, the questionnaire-checklist, casual interview and observation techniques were resorted to. The data gathered through the questionnaire were organized and tabulated. Analysis of data was done through the use of such statistical tools as weighted mean and t-test.

In this study a prototype was developed, which was beta tested or dry run particularly

with thirty six (36) students of Information Technology and Computer Science. The students used in the dry run were not part of the final sample of student-respondents.

RESULTS AND DISCUSSION

After a thorough analysis of the data gathered, the following findings were noted:

On the Status of the Existing Student Voting System. Commission on Elections (COMELEC) [1] in coordination with the Students' Affairs Office sit en-banc and promulgates the election rules and procedures [2]. COMELEC consists of seventeen volunteer students. Equipment used during the election period were official ballots, ballot boxes and tally sheets. Names of the different candidates are written on a Manila paper which serves as the tally sheets. The personal wristwatch of the COMELEC member serves as the official time clock during the election period. The election is held by the college at the covered court. After the election, counting of ballots by college and for the whole university is done. After all the ballots are tallied and results are written in the final tally sheets, the proclamation of the winner candidates follows.

On the Effectiveness of the Existing Student Voting System. It may be recalled that there were nineteen (19) recognized student organizations by the student affairs office. These 19 student organization advisers responded to the questionnaire floated for the study. These student organization advisers perceived the effectiveness of the existing student voting system of PSU – Lingayen Campus along with the three (3) areas namely, Manpower, Equipment, and system. Manpower, the three items listed in this area namely, adequacy of manpower, quality of service, and the teamwork/collaboration among the COMELEC were rated "Effective" with weighted means ranging from 3.00 to 3.43. The area average of 3.36 clearly indicates that the existing voting system is Effective in terms of manpower. This may be attributed to the fact that the existing student voting system is manned by the

COMELEC in coordination with the Students' Affairs Office. Hence, there is enough personnel to perform the task in this unit. Equipment, the four (4) items listed under this area, namely, official ballots, official ballot boxes, official tally sheets, and official time clocks were all rated by the student organization adviser – respondents "Effective" with weighted means ranging from 2.71 to 3.07. The area average of 2.95 reflects that the equipment used during the election period was Effective. System, there were two (2) items listed under this area. Of the two items, one item – "Speed of generating results" was rated "Somewhat Effective" with a weighted mean of 2.14. Another item – "Ensuring the integrity of ballots" was perceived to be Effective with a weighted mean of 2.93. The area average of 2.54 obtained from this area is an indication that in terms of system, the existing student voting system of PSU – Lingayen Campus is Effective. It may be noted that while the section was perceived to be somewhat effective in terms of speed of generating results of the elections, the existing student voting system seems to be working systematically. On the whole, the existing student voting system was perceived by the student organization advisers to be Effective. This was evidenced by the obtained grand average of 2.95, equivalent to effective. This is a rather high rating given by the student organization advisers. This situation may be attributed to the fact the student organization advisers, seldom if ever, experience problems during the election period because they are not directly performing the election-related task. Table 1 shows the effectiveness of the existing student voting system as perceived by the student organization advisers.

Table 1. Effectiveness of the existing student voting system as perceived by the student organization advisers.

Area	Weighted Mean	Equivalent
------	---------------	------------

MANPOWER		
Adequate manpower of the COMELEC	3.21	E
Quality of Service of the COMELEC	3.43	E
Teamwork/Collaboration of members of the COMELEC	3.00	E
Area Average	3.36	E
EQUIPMENT		
Official Ballots	3.07	E
Official Ballots Boxes	3.00	E
Official Tally Sheets	3.00	E
Official Time Clocks	2.71	E
Area Average	2.95	E
VOTING SYSTEM		
Ensuring the integrity of ballots	2.93	E
Speed of generating the results	2.14	SE
Area Average	2.54	E
GRAND AVERAGE		
	2.95	E

Legend:

Scale of Interpretation:

- | | |
|------------------------------------|-------------------------|
| <i>VE – Very Effective (4)</i> | <i>VE – 3.50 – 4.00</i> |
| <i>E – Effective (3)</i> | <i>E – 2.50 – 3.49</i> |
| <i>SE – Somewhat Effective (2)</i> | <i>SE – 1.50 – 2.49</i> |
| <i>NE – Not Effective</i> | <i>NE – 1.00 – 1.49</i> |

The existing student voting system was perceived by the students as "Somewhat Effective" with a grand weighted mean of 2.46.

The three hundred eighty six students of PSU – Lingayen Campus expressed their perception on the effectiveness of the existing student voting system. The students assessed the effectiveness of the existing student voting system using the same questionnaire accomplished by the student organization advisers. Their perceptions on the three areas in

the questionnaires are seen in Table 2. Manpower, items listed under this area were all perceived to be “Somewhat Effective” by the students with a weighted mean ranging from 2.34 to 2.43, all of which are equivalent to somewhat effective. This means that the manpower of the existing student voting system is not so adequate indicating a need for more student volunteers to the COMELEC. The area average of 2.40 indicates that the manpower of COMELEC is somewhat effective during the election period. Equipment, under the area of equipment, the first two, items namely, official ballots, official ballot boxes were perceived by the students to be Effective with weighted means of 2.77 and 2.63, respectively. The last two items namely, official tally sheets at official time clocks were perceived to be Somewhat effective with weighted means of 2.39 and 2.31, respectively. The area average of 2.53 indicates that the equipment used in the existing student voting system are effective during the election period. System, the sample student – respondents perceived this area to be Somewhat Effective as evidenced by an area average of 2.45. These findings are attributed to the fact that one cited – “Ensuring the integrity of ballots” was rated effective with a weighted mean of 2.61, while another item cited – “speed of generating results” was rated “Somewhat Effective” with a weighted mean of 2.28. This may be explained by the fact that even if there is adequate manpower of the COMELEC, there is no systematic flow when it comes to generating results of the elections. This observation implies the need to improve the existing student voting system of the PSU – Lingayen Campus. Viewed in total, the existing student voting system was perceived by the students as Somewhat Effective. This is shown by a grand weighted mean of 2.46 described as somewhat effective. This finding indicates that the students are desirous to have more improvement in the existing student voting system, particularly along with the areas of manpower and system.

Table 2. Effectiveness of the existing student voting system as perceived by the students.

Area	Weighted Mean	Equivalent
MANPOWER		
Adequate manpower of the COMELEC	2.34	SE
Quality of Service of the COMELEC	2.42	SE
Teamwork/Collaboration of members of the COMELEC	2.43	SE
Area Average	2.40	SE
EQUIPMENT		
Official Ballots	2.77	E
Official Ballots Boxes	2.63	E
Official Tally Sheets	2.39	SE
Official Time Clocks	2.31	SE
Area Average	2.53	E
VOTING SYSTEM		
Ensuring the integrity of ballots	2.61	E
Speed of generating the results	2.28	SE
Area Average	2.45	SE
GRAND AVERAGE		
	2.46	SE

Legend same as Table 1.

When it comes to the comparison of the respondents’ perception on the effectiveness of the existing student voting system. It may be recalled that there were two (2) groups of respondents- the student organization advisers and the students. These groups had varying perceptions on the effectiveness of the existing student voting system. The student organization advisers’ perception had a grand weighted mean of 2.95 or “Effective” while the students’ perception had a grand weighted mean of 2.46 or “Somewhat Effective.”

The null hypothesis raised for this part of the study was: There are no significant differences in the perceptions of the respondents regarding the effectiveness of the existing student voting system of PSU – Lingayen Campus.

The item means of the two groups of respondents were subjected to the test of significant differences. Computation of the t-Test resulted in a t-value of 3.69. When this value was checked against the criterion value in the t-Distribution Table for 16 degrees of freedom, it was found that it is more than 1.746, the minimum value required for significance at the five percent (5%) level. The obtained t-value, therefore, is significant. Hence, the null hypothesis earlier raised was rejected. The difference between the means of the two groups was 0.49, which was enough to warrant significant differences and the rejection of the null hypothesis. With this difference, it may then be inferred that the perceptions of the two groups of respondents were different. Table 3 reflects the computation of the t-Test.

Table 3
Computation of the t-Test

Mean and Mean Square of the Two Groups of Rating			
X ₁	X ₂	X ₁ ²	X ₂ ²
2.34	3.21	5.48	10.30
2.42	3.43	5.86	11.76
2.43	3.00	5.90	9.00
2.77	3.07	7.67	9.42
2.63	3.00	6.92	9.00
2.39	3.00	5.71	9.00
2.61	2.93	6.81	8.58
2.28	2.14	5.20	4.58
∑X ₁ = 22.18	∑X ₂ = 26.49	∑X ₁ ² =54.89	∑X ₂ ² =79.00

$$N_1=9 \quad N_2=9$$

$$\bar{X}_1=2.46 \quad \bar{X}_2=2.95$$

Difference between the Means= 0.49

$$\sum X_A^2 = 0.23 \quad \sum X_A^2 = 1.03$$

$$SE_{Dx} = 0.13$$

$$t = 3.69; \text{Significant}$$

$$t (df 16; .05) = 1.746$$

Legend: X₁- Mean of the first group (Students)
X₂- Mean of the second group (Student Organization Advisers)

The proposed computerized touchscreen student voting system is acceptable to the students. This is evidenced by a grand weighted mean of 4.76 which is equivalent to “Highly Acceptable”.

The proposed computerized touchscreen student voting system was presented to the 36 students of Information Technology and Computer Science only in order to assess its acceptability. The respondents gave their feedbacks by answering a ten-item questionnaire which was adopted from Kumar and Begum [3] which is presented with the following options: Highly Acceptable, Acceptable and Not Acceptable. Table 4 presents the feedback of the respondents regarding the proposed computerized touchscreen student voting system. Of the ten feedback items listed in the questionnaire, all the items had weighted means ranging from 2.50 to 2.89 equivalent to “Highly Acceptable”. The respondents, therefore, accept the following characteristics of the proposed computerized touchscreen student voting system:

Accurate, it is impossible for a vote to be altered, It is impossible for a validated vote to be eliminated from the final tally, It is impossible for an invalid vote to be counted in the final tally.

Democratic, it permits only eligible voters to vote. It ensures that each eligible voter can vote only once.

Ensures Privacy, Neither election authorities nor anyone else can link any ballot to

the voter who cast it, No voter can prove that he or she voted in a particular way.

Verifiable, Anyone can independently verify that all votes have been counted correctly.

Convenient, It allows voters to cast their votes quickly, in one session, and with minimal equipment or special skills.

Mobile, There are no restrictions on the location; the voting kiosk can be placed anywhere.

In general, the grand weighted mean of 2.76 reflects that the students accepted the feedback items presented. This means that the proposed computerized touchscreen student voting system is very acceptable to the students.

Table 4
Acceptability of the Students on the Proposed Computerized Touchscreen Student Voting System

AREA	Wtd. Mean	Title
Accuracy		
It is not possible for a vote to be altered	2.53	HA
It is not possible for a validated vote to be eliminated from the final tally	2.50	HA
It is not possible for an invalid vote to be counted in the final tally.	2.56	HA
Area Average	2.53	HA
Democracy		
It permits only eligible voters to vote	2.83	HA
It ensures that each eligible voter can only vote once	2.78	HA
Area Average	2.81	HA
Privacy		
Neither election authorities nor anyone else can link any ballot to a voter who cast it.	2.83	HA
No voter can prove that he	2.89	HA

or she voted in a particular way		
Area Average	2.86	HA
Verifiability		
Anyone can independently verify that all votes have been counted correctly	2.86	HA
Area Average	2.86	HA
Convenience		
It allows voters to cast their votes quickly, in one session, and with minimal equipment or special skills	2.83	HA
Area Average	2.83	HA
Mobility		
There are no restrictions in the location, the voting kiosk can be placed anywhere	2.67	HA
Area Average	2.67	HA
Grand Average	2.76	HA

Legend: Scale of Interpretation:

HA- Highly Acceptable (3) 3: HA: 2.50-3.00
A- Acceptable (2) 2: A: 1.50-2.49
NA- Not Acceptable (1) 1: NA: 1.00-1.49

With the rapid growth of the technology, computerized touchscreen student voting system appears to be a reasonable alternative to traditional elections. This study focused on developing such voting system that can support the fast and state of the art voting process, while implementing the security mechanisms required for preventing fraud and protecting student-voter's privacy. Ideally, student-voters gain a better voting experience at the polls, are more confident that their vote will be correctly counted, and are able to vote more easily and efficiently. Obviously, the significant benefit of the proposed voting system is the possibility for increased efficiency.

CONCLUSION AND RECOMMENDATION

In light of the findings in this study, the following conclusions were drawn:

The existing student voting system of the Pangasinan State University - Lingayen Campus warrants the need for innovation to ensure speedy and reliable obtain results.

The respondents, student organization advisers and students, differ in their perception about the effectiveness of the existing student voting system but are one in desiring speedy results.

The proposed Computer Touchscreen Student Voting System is worth implementing not only in the Pangasinan State University - Lingayen Campus but in all the Universities and Colleges who are using the traditional way of student voting system.

After a thorough consideration of the findings and conclusions of this study, the researcher highly recommends that the management of the different Universities and Colleges, particularly the sample University, the Pangasinan State University - Lingayen Campus, with the approval of the Students' Affairs Office and the University Student Council adopt the proposed computerized touchscreen student voting system in the near future.

REFERENCES

- [1] COMELEC. Commission on Elections. A student body which has the authority to judge, adjudicate on, or determine claims or disputes. They were volunteer students and screened by the Students' Affairs Office.
- [2] Election rules and procedures. Promulgated by the COMELEC and the Student Affairs Office who also sits as en banc.
- [3] D. Ashok Kumar, T. Ummal Sariba Begum (2012). "Electronic Voting Machine – A Review". International

Conference on Pattern Recognition, Informatics and Medical Engineering (PRIME-2012).

- [4] https://cs.stanford.edu/people/eroberts/Cs181/project/2006-07/electronics-voting/index_files/page0001.html