Assessment in the Adoption of Learner Information System (LIS) of the Selected Public Schools in Cavite Using the Diffusion of Innovation Theory

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Abstract: The Learner Information System (LIS) is an online registry of all formal and non-formal learners in the Philippine Basic Education System. It was designed and implemented with the objectives of knowing the learner's basic data and how they are progressing so that the department is well informed and properly guided in crafting learner-centered policies and programs to achieve the goal of providing quality education for all.

However, problems regarding the implementation of the system in the public schools are heard from teachers and LIS coordinators. There are also no statistical evaluations about the main reasons for the issues and concerns emerge in the adoption of LIS. These led the author to conduct a study and used Roger's Diffusion of Innovation (DOI) Theory. The main purpose of the study was to evaluate the adoption of LIS in the selected public schools in Cavite. Specifically, it focused on the schools' adoption level on LIS, the perceived dominant factors and the perceived problems in the adoption.

Based on the concepts of Rogers, a questionnaire was used to assess school participants' perceived problems in the adoption of LIS and perspective of the relative advantage, compatibility, complexity, trialability and observability of LIS. Research findings revealed that lack of trialability and complexity were negatively related to the adoption of LIS, and the most difficult problem they perceived was the “Server Error” which dominantly occurred in the survey of (88%). With this, an integral part of the study was to develop an assessment framework for the enhancement and effective implementation of LIS in the Philippines.

Introduction
The Learner Information System (LIS) is an online registry of all formal and non-formal learners in the Philippine Basic Education System. It was designed and implemented with the objectives of knowing the learner's basic data and how they are progressing so that the department is well informed and properly guided in crafting learner-centered policies and programs to achieve the goal of providing quality education for all.

In relation to the implementation of LIS in all basic education level, problems are heard from teachers and LIS coordinators. There are also no statistical evaluations about the main reasons for the issues and concerns emerge in the adoption of LIS. This undertaking was indeed an effort to bridge this gap. Generally, the study aimed to evaluate the adoption of Learner Information System (LIS) in the selected public schools in Cavite with the utilization of the diffusion of innovation theory (DOI). Specifically, it focused on the schools' adoption level on LIS, significant difference on the level of adoption of LIS, the perceived dominant factors and the perceived problems in the adoption.

REVIEW OF RELATED LITERATURE
A. Diffusion of Innovation Theory

When new innovations are created, developers are interested in how they will diffuse to their intended audience. This raises the question of how to determine the adoptability of the innovation. This information is important when defining the success of the innovation (Procaccino et al. 2005). One common method for understanding the adoptability of an innovative technology, especially in an educational setting, is Rogers' theory of diffusion of innovations (Martins et al. 2004, Kebrichti 2010). This theory is useful for instructional technologists to explain, predict and account for the factors that impede or facilitate the diffusion of their products” (Kebrichti 2010).

Isleem (2003) examined the level of computer use for instructional purposes by technology education teachers in Ohio public schools using quantitative research methods and Roger's diffusion theory, Less' (2003) quantitative research study used Rogers' diffusion of innovations theory to investigate faculty adoption of computer technology for instruction in the North Carolina Community College System.

Surendra (2001) examined the diffusion factors proposed by Rogers (1995) and other sources to predict the acceptance of Web technology by professors and administrators of a college.

Another study was conducted by Zakaria (2001) on factors related to IT implementation in the curriculum. The selected factors in the study were the Malaysian Ministry of Education Polytechnic faculty members' attitudes toward IT, their IT use in teaching, and the
availability of IT.

One study conducted by Chen et al. (2008) at the University of Central Florida utilized the diffusion of innovation theory to investigate how wikis were implemented by instructors in Political Science, Education, and Health Information.

B. Learners’ Information System

DepEd Order 67, s. 2011 indicates the submission of Final Masters Lists of Pupils/Students and ALT Learners as of July 31, 2011 in all public elementary and secondary schools and community learning centers (CLCs) are required.

DepEd Order 22, s. 2012 states that in order to facilitate the tracking of pupils, students or learners and their performance, a Unique Learner Reference Number (LRN) will be issued to all public school pupils and students and Alternative Learning System (ALS) learners based on School Year (SY) 2011-2012.

DepEd Order Nos. 67, s. 2011 and 22, s. 2012 implies that the Learner Information System (LIS) was implemented in government schools and Community Learning Centers (CLCs) in September 2012.

DepEd Order 33, S. 2013 stipulates that after the housekeeping activity is completed, public schools and ALS CLCs shall proceed with the updating of the Learner Registry for SY 2013-2014 following the schedule of activities stipulated in this Order.

DepEd Order 13, S. 2014 states the Department of Education (DepEd) has enhanced its Learner Information System (LIS), which is ready for Updating of Learner Profiles for School Year (SY) 2013-2014 through online access starting February 26, 2014 (DO 13, S. 2014).

Theoretical Framework

Rogers’ (2003) Diffusion of Innovations theory provided the theoretical framework for this study. A theory that have been widely tested and implemented. It has been used to explain individuals and social systems adoption of new ideas, inventions and practices. Rogers’s theory of perceived attributes of innovation defines five characteristics of an innovation which have been shown to affect the rate of its adoption in a society. Each of the elements of this theory is described as follows:

Relative advantage: the degree to which the innovation is perceived to be superior to current practice. According to Robinson (2009), it is measured in terms that matters to those users, like economic advantage, social prestige, convenience or satisfaction. The greater the perceived relative advantage, the more rapid its rate of adoption.

Compatibility: the degree to which the innovation is perceived to be consistent with socio-cultural values, previous ideas and/or perceived needs. An idea/innovation that is incompatible with a potential user’s values, norms, or practices will not be adopted as rapidly as an innovation that is compatible.

Complexity: The degree to which an innovation is perceived as difficult to use and understand. It is hypothesized to be negatively related to the rate of adoption of an innovation (Rogers, 1995).

Trialability: The degree to which the innovation can be experienced on a limited basis. It is the fourth factor in promoting the adoptability of an innovation by providing the opportunity for a potential user to experience using the innovation itself.

Observability: The degree to which the results of the innovation are visible to potential adopters. The easier it is for individual to see the results of an innovation, the more likely they are to adopt it.

Conceptual Framework - Input

This presents the Learner Information System as the innovation and the six (6) divisions of the selected public schools where the study will be conducted. This includes the division of Bacoor, Cavite, Cavite City, Dasmarinas, Gen. Trias and Imus.

Process

The study used Rogers’ 2003, Diffusion of Innovation’s five attributes namely: Relative Advantage; Compatibility, Complexity, Triability and Observability to evaluate the selected public schools adoption of LIS.

Output

The output of conceptual framework, presents the development plan for LIS enhancement and for effective implementation of the system. It aims to provide conclusions and recommendations for its effective use.

Figure 1. Conceptual Framework of the Assessment in
the Adoption of Learner Information System (LIS) of the Selected Public Schools in Cavite Using the Diffusion of Innovation Theory

METHODOLOGY

Research Design
The type of research that was used in this study was a quantitative approach of research that used descriptive correlational research design to understand what kind of relationships naturally occurring variables have with one another.

Sources of Data
This study was conducted at the selected public schools in Cavite with the total of forty-two (42) LIS coordinators as representatives in school – participants and two hundred ten (210) teacher - participants which all from public schools in Central Elementary and National High Schools.

Sampling Method
Random sampling was used to identify the participants' school which are included in the study. The number of the school– respondents were obtained from the DepEd Division of Cavite Province located at the Trece Martires City.

Research Instrument
The researcher formulated two sets of questionnaires. In Set-A questionnaire the respondents are the teacher-participants and in set-B are the LIS coordinators.

Phase 1 of Set-A of the data collecting procedure used a self-made type of questionnaire for the teacher-participants demographic profile (Q1). Set-B included the school-participants profile (Q2). Phase II of the collecting procedure, used a self-made test. Rogers' five innovation attributes were used to create questions on LIS coordinators perceptions: on the relative advantage (Q1-Q5); compatibility (Q6-Q10); complexity (Q11-15); trialability (Q16-Q20); and observability (Q21-Q25). Perceptions about the attributes of innovations included questions Q1-Q25, used a 4-Point Likert forced answer scale (1-Strongly Disagree, 2-Disagree, 3-Agree, and 4-Strongly Agree).

Finally, the Phase III, is also a self – made test which determined the problems faced by the LIS school coordinators.

Validation of the Research Instrument
These questionnaires were validated by the three (3) LIS coordinators in Tanza National Trade School, one (1) of them is the former LIS coordinator and two are the present LIS coordinators of the school. Their suggestions and comments were considered in the development of the final draft of the instrument.

Reliability
Kombo and Tromp (2006) define reliability as a way of ensuring consistency of the results from a test. An instrument is reliable if it can ensure a factor that is liable to vary accurately and consistently and get the same results under the same conditions over a period of time. To test reliability of the research instrument the LIS coordinator, a psychometrician and an English teacher of Tanza National Trade School were requested to analyze the applicability and usefulness of the content and format of the questionnaire. The research instruments were pilot tested to ten (10) LIS coordinators and ten (10) teachers.

Data Gathering Procedures
Prior to the distribution of the questionnaire, a Letter of Endorsement to conduct Research was secured from the respective Schools Division Superintendent of DepEd in the different divisions of Cavite Province. After furnishing the recommending approval, permission for the distribution of the research instruments and to the gather data were sought from the principal of the school. Then the research instruments were retrieved, tallied, analyzed and used for statistical treatment.

Data Analysis
For the quantitative data, the answer to the survey question is consolidated and descriptive statistical tools were used to present and analyze the data. The following statistical treatments were employed:

1. Percentage and frequency was used for the demographic profile of the teacher – participants.
2. Percentage and frequency was used for the school-participants profile.
3. Mean and standard deviation was used to determine the teacher-participants and school-participant's level of adoption of LIS in terms of: Relative Advantage, Compatibility, Complexity, Trialability, and Observability.
4. Friedman's Two-way Anova was used to determine the dominant factors in adopting LIS in terms of the demographic profile of the teacher-participants level and school-participants.
5. Mann-Whitney U test and Kruskal-Wallis One-way Anova were used to determine the significant difference on the level of adoption of LIS when grouped according to the demographic profile of the teacher-participants and school-participants.
6. Percentage and frequency was used to perceived problems by the teacher participants and LIS coordinators in the adoption of LIS.

Results and Discussion
This section presents the results and discussion of the data collected from the research instrument used.

I. Respondents Profile

A. Demographic profile of teacher-participants according to school divisions.

There were two hundred ten (210) teacher-participants in this study which was dominated by the Division of Cavite which had one hundred thirty-five (135) participants, that was sixty-four percent (64.3%) (Table 1). This was followed by the different divisions such as Division of Cavite City, Dasmariñas, General Trias, Bacoor City, and Imus City which had fifteen (15) teacher-participants that was seven-point one percent (7.1%) with the total of thirty-five-point five percent (35.5).

B. Demographic profile of school coordinator-participants according to school divisions.

The Division of Cavite had 28 LIS coordinators in the different respective school, which dominantly got a sixty-six point seven percent (66.7%), this was followed by the four (4) divisions of Cavite City, Dasmariñas, General Trias and Bacoor City which had a three (3) LIS Coordinators (Table 6). This was equivalent to the seven-point one percent (7.1%) from each division. Last was the Division of Imus which had only two (2) coordinators in their division which was the four-eight percent (4.8%).

II. Teacher and Coordinator-Participants’ Level of Adoption

Based on Mean and standard deviation that was used (Table 13 and 15), almost all the attributes get “very high” verbal interpretation such as the (a) Relative Advantage; (b) Compatibility; and (c) Complexity and (d) Observability except for the (e) Triability which just got a “high” verbal interpretation. Rogers’s theory of perceived attributes of innovation has been shown to affect the rate of its adoption in a society (Cullen, 2001). Rogers (2003) mentioned that the rate of adoption is partially influenced by perceived attributes namely: relative advantage, compatibility, complexity, trialability, and observability.

III. Dominant Factors that Affect the Adoption of LIS.

Based on Friedman’s Two-way Anova (Table 25) that was used, the attributes such as: Relative advantage, Compatibility and Observability got a verbal interpretation of accepting the null hypothesis. However, remarkable details here were the attributes namely: Complexity and Trialability which the only attributes with a verbal interpretation of rejecting the null hypothesis with the p-value of .045 for the complexity and .013 for Trialability. This can be interpreted that Complexity and Trialability were the attributes that had a significant difference from the Elementary and secondary type of education which implies that the participants have problems encountered with these attributes.

Table 25. Level of Adoption of LIS according to the Demographic Profile of the Division of School-Participant when grouped per Type of School Division

<table>
<thead>
<tr>
<th>Type of Education</th>
<th>Mean Rank</th>
<th>Mean</th>
<th>Total Mean Rank</th>
<th>Total Mean</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td>21.38</td>
<td>3.45</td>
<td>70.59</td>
<td>Accept</td>
<td>Ho</td>
</tr>
<tr>
<td>Secondary</td>
<td>21.37</td>
<td>3.45</td>
<td>70.59</td>
<td>Accept</td>
<td>Ho</td>
</tr>
<tr>
<td>Compatibility</td>
<td>21.38</td>
<td>3.45</td>
<td>70.59</td>
<td>Accept</td>
<td>Ho</td>
</tr>
<tr>
<td>Complexity</td>
<td>21.38</td>
<td>3.45</td>
<td>70.59</td>
<td>Accept</td>
<td>Ho</td>
</tr>
<tr>
<td>Trialability</td>
<td>21.38</td>
<td>3.45</td>
<td>70.59</td>
<td>Accept</td>
<td>Ho</td>
</tr>
<tr>
<td>Observability</td>
<td>21.38</td>
<td>3.45</td>
<td>70.59</td>
<td>Accept</td>
<td>Ho</td>
</tr>
<tr>
<td>Total</td>
<td>21.38</td>
<td>3.45</td>
<td>70.59</td>
<td>Accept</td>
<td>Ho</td>
</tr>
</tbody>
</table>

IV. Significant Difference on the Level of Adoption of LIS.

A. Teacher-Participants

There was a significant difference between the level of adoption of LIS when grouped according to the demographic profile of the teacher-participants in Adopting LIS (Table 16). The computed coefficient of Friedman Statistics was 62.214 which denoted a difference with variables with a p-value of 0.00, which was greater than 0.05 the findings rejected the null hypothesis.

B. School-Coordinators Participants

There was a significant difference between the level of adoption of LIS when grouped according to the demographic profile of the school-participants in Adopting LIS (Table 17). The computed coefficient using Friedman Statistics with much lower result: 12.331 which denoted a difference with variables with a p-value of 0.15, which is greater than 0.05 the findings rejecting the null hypothesis.

V. Perceived Problems in Adopting LIS

Coordinator and teacher- participants who used the LIS found the following as problems in adopting the LIS in their respective schools (Table 29). The most difficult problem they perceived was the “server Error”...
which dominantly occurred in the survey. The said problem had a big contribution of eighty-eight percent (88%) problem faced by both the coordinators and the teacher participants.

Table 29. Perceived Problems in Adopting LIS

<table>
<thead>
<tr>
<th>Perceived Problems in Adopting LIS</th>
<th>Coordinators</th>
<th>Teachers</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>Percent</td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>Difficult to register accounts</td>
<td>8</td>
<td>19.0</td>
<td>64</td>
</tr>
<tr>
<td>Lack of maintenance</td>
<td>3</td>
<td>7.1</td>
<td>28</td>
</tr>
<tr>
<td>Server Error</td>
<td>37</td>
<td>88.1</td>
<td>185</td>
</tr>
<tr>
<td>Privacy and security</td>
<td>11</td>
<td>24.2</td>
<td>28</td>
</tr>
<tr>
<td>Need for system enhancement</td>
<td>7</td>
<td>16.7</td>
<td>38</td>
</tr>
</tbody>
</table>

CONCLUSION

Using Friedman Statistics for the LIS School Coordinators for Relative Advantage with the mean of 3.41 p-value of 0.485, Compatibility with the mean of 3.47 of .151 p-value, Complexity with the mean of 3.25 and a p-value of .354, Triability, with the mean of 3.31, p-value of .157 an observability with the mean of 3.42 and a p-value of .285, all with a verbal interpretation of Accepting the Null hypothesis which is, “There is no significant difference on the level of adoption of LIS when grouped according to the demographic profile of the school-participants in terms of Relative Advantage, Compatibility, Complexity, Triability and Observability. Table 24 discusses the level of adoption of the LIS when group according to the demographic profile of the school participants. Using Friedman Statistics for the LIS School Participants according to different division shows the different mean for Relative Advantage of each school participants such as for the division of Cavite - 3.48, Cavite City - 2.87, Dasmarinas - 3.20, General Trias City - 3.40, Bacoor City - 3.40 and the division of Imus City with the mean of 3.60, p-value of .157 an observability with the mean of 3.42 and a p-value of .086, all with a verbal interpretation of Accepting the Null hypothesis. The result was also the same to the other variables such as Compatibility, Complexity, Triability and Observability when group to the school division which all interpreted as accepting the null hypothesis.

Table 25 shows result of the finding of the study when grouped according to type of Education. The following attributes such as Relative advantage, Compatibility and Observability which got a verbal interpretation of accepting the null hypothesis. However, remarkable details here are the attributes namely Complexity and Triability which the only attributes with a verbal interpretation of rejecting the null hypothesis with the p-value of .045 for the complexity and .013 for Trialability. This can be interpreted that Complexity and Trialability are the attributes that have a significant difference from the Elementary and secondary type of education which implies that the participants have problems encountered with these attributes.

RECOMMENDATION

Based on the findings of this study, the next time that another system will be implemented in the Department of Education the following recommendations are given:

For effective implementation of the LIS in the schools.

1. Proposed training/seminar program for the teachers with no computer background or with computer difficulties be given since Table 17 shows that there is a significant difference in adopting the LIS when grouped to teacher-participants, especially in the attributes of triability which is the degree to which the innovation can be experienced on a limited basis only.

2. Rapid Speed for the internet connection is suggested and recommended. School budget should be allotted to ensure the good connection to remove stress from LIS coordinator as well as the teacher participants using the LIS.

3. Availability of bigger computer laboratories or e-libraries with enough number of computer units for a conducive working place for the LIS personnel.

For the enhancement of the system:

4. Develop a program that can be user-friendly. When grouped to teacher-participants, another attributes which is low is the complexity.

5. For the coordinators and teachers of the schools the most difficult problem they perceived was the “Server Error” which dominantly occurred in the survey. The said problem had a big contribution of eight-eight percent (88%) which face both coordinators and the teacher participants.
This must be fixed by the department education LIS team.

6. Additional facility for updating the status of learners who are tagged declined or temporarily enrolled due to their financial obligation in their previous schools.

Additional system:

7. Instill additional quality measures and standards in updating the primary information of the learners, corrections and erroneous enrolment aside from seeking the approval of the school head.

8. Batch scheduling in the registration of accounts to avoid traffic.

9. Conduct a regular needs assessment to properly address issues and concerns about LIS.

For the future researchers:

10. The researcher also purposed to use other methodologies such as forum, group discussion and interview with the use of other research approach like qualitative or mix which is the combination of the qualitative and quantitative type of research.

REFERENCES


DepEd Order No. 67, s. (2011).
DepEd Order No. 22, s. (2012).
DepEd Order No. 13, s. (2014).