

## **ASSESSMENT OF PHYSICS QUALIFYING EXAMINATION FOR EE AND ECE COURSES: AN ITEM AND OPTION ANALYSIS**

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### **ABSTRACT**

*In this paper, the proponents assessed the Physics qualifying examination in Lyceum of the Philippines University-Laguna (LPU-L) for incoming third year Electrical and Electronics Engineering students for A.Y. 2013-2014 using Statistical Item and Option Analysis. Using the descriptive method and stratified random sampling, the researchers evaluated 35 test questions from Physics subject. There were 77 incoming third year respondents (28 EE and 49 ECE). The percentage composition of items in terms of difficulty level justified that the test questions were good. However, when the actual percentage composition was compared with the desired distribution of difficulty levels in a test, it was found out that the distribution of test questions for “Moderately Difficult” and “Difficult” categories were valid. It was determined that there were a total of 8 (22.86%) test questions that should be revised/rejected and there were a total of 27 (77.14%) test questions that must be retained, since it passed the difficulty and discrimination index measures.*

**Keywords:** *test evaluation, option analysis, item analysis, table of specifications, discrimination index.*

### **INTRODUCTION**

Item analysis is a process of examining the test questions given to the students and their answers. This process would give an assessment on the number of items to be given and the quality of the administered test questions. Indeed, this process is a must in standard and objective evaluation of the performance of the students. Siri and Freddano in their

research work in 2011 evaluated the performances of the students by testing. Their respondents were the students of primary and middle schools. On their analysis, they concluded that the tests they have given must be re-designed (Siri and Freddano, 2011).

It is very common for instructors to use multiple-choice type of examination. As cited by Rodriguez in 2005, multiple-choice items should be utilized in achievement kind of test (Rodriguez, 2005). In the study of Lei et.al in 2003, the parametric and the nonparametric multiple-choice and kernel smoothing approaches were used to estimate option characteristic functions (OCCs) (Lei et.al, 2003).

Spurling in 1984 focused on describing school administration's program for placing the students with respect to their test results. The administered tests were evaluated in aiding test development using item and test analysis. Standard statistical measures and several modules were designed as well in assisting the education administrator (Spurling, 1984).

Yu and Wong in 2007 introduced how Statistical Analysis System (SAS) can be applied to classical item analysis (CIA), which is commonly used by psychometricians. This includes the computation of p-values, discriminations, point biserial correlations, and logits. They even studied and discussed option analysis and realized that the ultimate aim of item analysis is examining the clarity and the plausibility of distracters in multiple-choice items type of test (Yu and Wong, 2007).

*“Lyceum of the Philippines University - Laguna (LPU-L), an institution of higher learning, inspired by the ideals of Philippine President Jose P. Laurel, is committed to the advancement of his philosophy and values: “Veritas et Fortitudo” (truth and fortitude) and “Pro Deo et Patria” (for God and Country).”* This is the Educational Philosophy honed for a decade

by Dr. Sotero H. Laurel as he envisioned LPU-L, “as a leading university in the Asia Pacific region, dedicated to the development of the integral individual who constantly seeks the truth and acts with fortitude in service to God and country”.

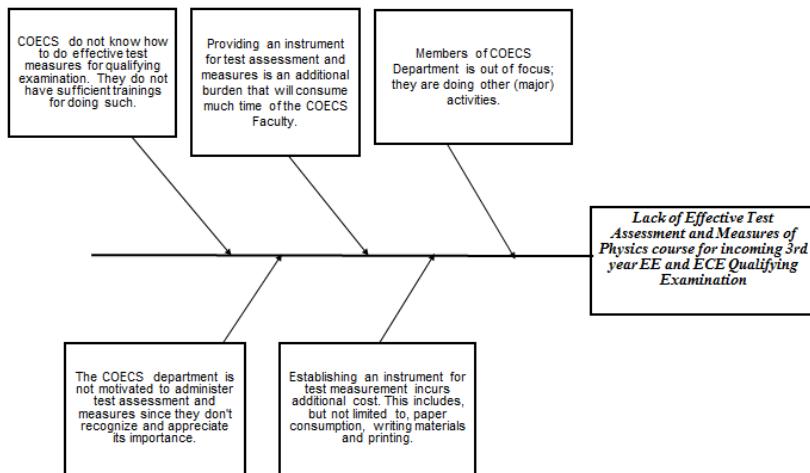
In an institution aiming for higher education, it is essential to assess the learning of the students by providing them effective and competent test questions. It is vital that teachers should be able to construct test questions aligned with the course syllabus and table of specifications. It must be checked, verified and approved by Faculty heads. In this accord, the study of Education Statistics needs to be considered. The proponents believed that engineering discipline is purposive. It is a platform of commitment, passion and devotion of global competence and innovativeness. Lyceum of the Philippines Laguna, in its sense, had widened its linkages, breaks the horizons of industries and had sought integral development of the students. It rest assured that engineers in Lyceum of the Philippines Laguna is able to provide limitless scopes of knowledge and understanding, a global engineer needs to possess.

The institution is very much concerned in instructional development to promote student's welfare towards innovative success. In due time, LPU-Laguna shall be able to produce productive engineering graduates with competence in global perspective. The kind of “engineering graduate” LPU-Laguna offers has made a remarkable breakthrough, honing student's crafts and bringing out the best, inculcating the proper ways and building the tons of self-confidence to entire community. LPU-Laguna does these all. These are dreams attainable only if the teachers are proficient enough to provide effective test assessment and measures. Usually, a test is apprehended as the mirror of what happened in the classroom. More than replication, test can be best described as a tool to measure the competency

of the teachers and the fullness of the students' development. It is through series of examinations that students may pass or fail. However, it is morale to fairly pass or fail a student on his/her abilities and performance accord.

As faculty of LPU-Laguna under the College of Engineering and Computer Studies (COECS), the researchers believe that pursuing studies on improving the competencies of faculty in terms of providing effective test questions and student's performance measures is indeed very important. It is believed that effective test measures bridges the gap between quality education and globally competitive graduates. This concept adheres to the vision, mission and educational philosophies of the institution.

### **Statement of the Problem**



**Figure 1. Ishikawa diagram of the study**

In stating and enumerating the problems incurred and in providing viable solutions, the proponents conducted brainstorming among faculty members and established a cause and effect diagram. Figure 2 shows the

fishbone diagram of the study. The causes are categorized in terms of Productivity, Quality, Cost, Delivery and Motivation.

The analysis of causes led to *Lack of Effective Test and Measures of Physics course for incoming 3<sup>rd</sup> year EE and ECE students* as its effect. The cause and effect diagram was formulated by the proponents by means of an informal brainstorming with selected Engineering faculty members. The information gathered was itemized on different categories namely: Productivity, Quality, Cost, Delivery and Motivation (Evans, 1997). In terms of Productivity, most of the members of the COECS Faculty are out-of-focus and doing other activities. Also, since they are much concerned with their duties and responsibilities as teachers, they are not able to spend time in measuring their test questions. In dealing with Quality as a category, the members of the COECS Faculty are not given enough training and awareness on the need of having effective test assessment and measures. They also lack knowledge, trust and credibility. The COECS Faculty believes that having test measurement would mean an additional Cost. For them, it is an additional burden that would consume much of their time and it will be inaccessible to the students, considering Delivery. Lastly, COECS Faculty failed to recognize and appreciate the importance of test analysis; they believe that it is not necessary to have such assessment (Motivation).

### **Objectives of the Study**

The study aims to focus on the *Assessment of Physics Qualifying Examination for incoming 3<sup>rd</sup> year EE and ECE courses by Statistical Item and Option Analysis in Lyceum of the Philippines University - Laguna (LPU-L)* to provide efficient way of measuring and developing test questions for Physics qualifying examinees. Specifically, the proponents undertook this study with the following objectives in mind: 1. To assess Physics Qualifying

Examination for A.Y. 2013-2014 using Statistical Item and Option Analysis, 2.To compare actual percentage comparison with a desired distribution of difficult levels in a test, and 3.To provide an effective test questions for Physics.

## **METHODOLOGY**

### **Methodology of Analysis**

In order to unravel the different problems encountered in the assessment of Physics Qualifying Examination for A.Y. 2013 – 2014 by Statistical Item and Option Analysis in LPU-L, the researchers used the descriptive method. Descriptive investigation include studies, which caters facts pertaining to group of people, different conditions, classes of events and/or kind of phenomena in which researcher/s would want to study (Orcullo, 2000).

### **Sampling Technique**

The proponents used a type of sampling suitable for the study. Stratified sampling, in this view, was the sampling method used. In this sampling method, identified subgroups in the population are being selected as sample proportions. Considering that it can be used as well in selecting equal – sized samples from each number of subgroups, the proponents make used of it. In this research, the proponents gathered the entire samples of incoming 3<sup>rd</sup> year of courses EE (28) and ECE (49) for A.Y. 2013-2014 (Calderon and Gonzales, 1993) (Altares et.al, 2003). There were a total of 77 respondents for 35-item Physics qualifying examination for incoming third year of EE and ECE courses. The proponents preferred Stratified random sampling because this method is more convenient and practical in making a study with limited span of time. In addition, this sampling is easy to use and

is not time-consuming. The test questionnaires, used as sample are multiple choice questions. The proponents considered ECE as high group and EE as low group. The proponents did not arrange each group from highest to lowest considering that they are of equal potential. There are the thirty five (35) test questionnaires taken from Physics course.

### **Instrumentation**

In a statistical inquiry, proponents should organize tools and methods intended to elicit solutions to the stated problems. In this study, the proponents make use of different statistical tools to analyze test questions effectively. Item Option analysis was used to estimate the level of difficulty of test item by comparing the frequency of answers of the students from one option to another. The test questions are statistically analyzed to achieve the proponent's objectives. The test questionnaires, together with the respondent's answers, were collected, tallied, and analyzed by the proponents. The gathered data were presented in tables to visualize the extent and magnitude of the problems. Meeting these criteria gives a perfect system of test evaluation for the proponents (Brion et.al, 2009).

### **Research Procedures**

The proponents make use of methods, analytical approaches and tools to accurately interpret data results. The data are represented and correlated systematically using tables. In assessing the statistical properties of Physics qualifying examination, the proponents make use of the Item Option Analysis. For each item, based on the tally of answers, the table presents the number of students responding for each item, the difficulty level (the percentage of students that answered the correct item), and the discrimination index (the point-biserial correlation between success on the item and a total score). The test questions were gathered by the proponents

to assess the need of having effective assessment and measures of Physics qualifying examination. *Refer to Tables 1 to.3 for the tally of answers for EE group, ECE group and combined group, respectively.* The answers of the students were compared with the answers of other students through correlation technique. For multiple-choice items, the result presents the percentage of students that chose each option, including the percentage that omitted or did not reach the item, and the point-biserial correlation between each option and the total score. For the purpose of computing the discrimination index, the total score was taken as the percentage of items a student answered correctly in each item (Mullis and Martin, 2003).

**Table 1. Tally of answers for EE group**

	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
A	0	5	12	6	7	7	2	6	6	4	9	9	9	7	6
B	11	6	8	10	3	8	9	6	16	13	7	6	9	7	9
C	3	17	5	8	8	10	10	8	2	7	12	8	6	9	6
D	14	0	3	4	10	3	7	8	4	4	0	5	4	5	7
TOTAL	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
A	0	11	7	4	11	9	1	1	0	1	23	7	3	1	3
B	13	10	5	8	3	3	5	5	11	24	2	1	1	3	24
C	15	5	13	1	14	14	21	13	6	3	0	20	20	4	1
D	0	2	3	15	0	2	1	9	11	0	3	0	4	20	0
TOTAL	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
	96	97	98	99	100										
A	4	0	3	2	15										
B	5	4	5	22	7										
C	17	23	12	0	3										
D	2	1	8	4	3										
TOTAL	28	28	28	28	28										

**Table 2. Tally of answers for ECE group**

	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
A	4	4	15	14	3	15	8	18	2	5	19	21	18	18	9
B	18	10	19	14	10	12	12	4	30	24	9	8	15	10	23
C	7	22	13	14	18	18	15	16	6	7	15	13	10	12	8
D	20	13	2	7	18	4	14	11	11	13	6	7	6	9	9
TOTAL	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49
	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
A	10	16	12	17	13	8	2	1	9	1	35	10	2	3	4
B	17	16	19	18	3	5	6	3	11	24	1	3	4	2	36
C	14	9	16	4	29	33	33	26	9	18	8	33	37	7	7
D	8	8	2	10	4	3	8	19	20	6	5	3	6	37	2
TOTAL	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49
	96	97	98	99	100										
A	8	6	7	2	17										
B	8	4	18	37	21										
C	30	30	17	8	7										
D	3	9	7	2	4										
TOTAL	49	49	49	49	49										

**Table 3. Tally of answers for EE and ECE group**

ITEM	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
A	4	9	27	20	10	22	10	24	8	9	28	30	27	25	15
B	29	16	27	24	13	20	21	10	46	37	16	14	24	17	32
C	10	39	18	22	26	28	25	24	8	14	27	21	16	21	14
D	34	13	5	11	28	7	21	19	15	17	6	12	10	14	16
TOTAL	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77
ITEM	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
A	10	27	19	21	24	17	3	2	9	2	58	17	5	4	7
B	30	26	24	26	6	8	11	8	22	48	3	4	5	5	60
C	29	14	29	5	43	47	54	39	15	21	8	53	57	11	8
D	8	10	5	25	4	5	9	28	31	6	8	3	10	57	2
TOTAL	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77
ITEM	96	97	98	99	100										
A	12	6	10	4	32										
B	13	8	23	59	28										
C	47	53	29	8	10										
D	5	10	15	6	7										
TOTAL	77	77	77	77	77										

## RESULTS AND DISCUSSION

Table 4 shows the item and option analysis worksheet. In this table, each question is classified into high or low group (ECE being the high group and EE being the low group) and the answers for each option are being tallied. The discrimination index is also computed as it helps the proponents to determine whether he will retain, remove or revise the question. On the other hand, Table 5 shows the percentage composition of items in terms of difficulty level, it was realized that most of the questions can be categorized as moderately difficult (17), difficult (7) and very difficult (7). There were no question assessed as very easy (0), yet there were four (4) questions measured as very easy. If we are to plot this using normal distribution curve, we may observe that it is skewed to the left since more questions would fall under the “difficult” side than the “easy” side.

**Table 4. Item and option analysis worksheet**

Item No.	Group	Options				P(ECE)	P(EE)	Pt	Remarks for Pt	Remarks	Judgment
		A	B	C	D						
66	ECE	4	18	7	20	0.36735	0.39286	0.38	Moderately Difficult	Very Acceptable; include most, if not all	RETAIN
	EE	0	11	3	14						
	TOTAL	4	29	10	34						
67	ECE	4	10	22	13	0.44898	0.60714	0.528	Moderately Difficult	Very Acceptable; include most, if not all	RETAIN
	EE	5	6	17	0						
	TOTAL	9	16	39	13						
68	ECE	15	19	13	2	0.38776	0.28571	0.337	Moderately Difficult	Very Acceptable; include most, if not all	RETAIN
	EE	12	8	5	3						
	TOTAL	27	27	18	5						
69	ECE	14	14	14	7	0.14286	0.14286	0.143	Difficult	Limited in Acceptability; include some	REJECT
	EE	6	10	8	4						
	TOTAL	20	24	22	11						
70	ECE	3	10	18	18	0.20408	0.10714	0.156	Difficult	Limited in Acceptability; include some	RETAIN
	EE	7	3	8	10						
	TOTAL	10	13	26	28						
71	ECE	15	12	18	4	0.2449	0.28571	0.265	Moderately Difficult	Very Acceptable; include most, if not all	RETAIN
	EE	7	8	10	3						
	TOTAL	22	20	28	7						
72	ECE	8	12	15	14	0.28571	0.25	0.268	Moderately Difficult	Very Acceptable; include most, if not all	RETAIN
	EE	2	9	10	7						
	TOTAL	10	21	25	21						
73	ECE	18	4	16	11	0.36735	0.21429	0.291	Moderately Difficult	Very Acceptable; include most, if not all	RETAIN
	EE	6	6	8	8						
	TOTAL	24	10	24	19						
74	ECE	2	30	6	11	0.22449	0.14286	0.184	Difficult	Limited in Acceptability; include some	RETAIN
	EE	6	16	2	4						
	TOTAL	8	46	8	15						
75	ECE	5	24	7	13	0.10204	0.14286	0.122	Difficult	Limited in Acceptability; include some	REJECT
	EE	4	13	7	4						
	TOTAL	9	37	14	17						

*(Table continues)*

Item No.	Group	Options				P(ECE)	P(EE)	Pt	Remarks for Pt	Remarks	Judgment
		A	B	C	D						
76	ECE	19	9	15	6	0.38776	0.32143	0.355	Moderately Difficult	Very Acceptable; include most, if not all	RETAIN
	EE	9	7	12	0						
	TOTAL	28	16	27	6						
77	ECE	21	8	13	7	0.16327	0.21429	0.189	Difficult	Limited in Acceptability; include some	RETAIN
	EE	9	6	8	5						
	TOTAL	30	14	21	12						
78	ECE	18	15	10	6	0.36735	0.32143	0.344	Moderately Difficult	Very Acceptable; include most, if not all	RETAIN
	EE	9	9	6	4						
	TOTAL	27	24	16	10						
79	ECE	18	10	12	9	0.36735	0.25	0.309	Moderately Difficult	Very Acceptable; include most, if not all	RETAIN
	EE	7	7	9	5						
	TOTAL	25	17	21	14						
80	ECE	9	23	8	9	0.46939	0.32143	0.395	Moderately Difficult	Very Acceptable; include most, if not all	RETAIN
	EE	6	9	6	7						
	TOTAL	15	32	14	16						
81	ECE	10	17	14	8	0.34694	0.46429	0.406	Moderately Difficult	Very Acceptable; include most, if not all	RETAIN
	EE	0	13	15	0						
	TOTAL	10	30	29	8						
82	ECE	16	16	9	8	0.18367	0.17857	0.181	Difficult	Limited in Acceptability; include some	RETAIN
	EE	11	10	5	2						
	TOTAL	27	26	14	10						
83	ECE	12	19	16	2	0.38776	0.17857	0.283	Moderately Difficult	Very Acceptable; include most, if not all	RETAIN
	EE	7	5	13	3						
	TOTAL	19	24	29	5						
84	ECE	17	18	4	10	0.20408	0.53571	0.37	Moderately Difficult	Very Acceptable; include most, if not all	RETAIN
	EE	4	8	1	15						
	TOTAL	21	26	5	25						
85	ECE	13	3	29	4	0.06122	0.10714	0.084	Very Difficult	Not acceptable or limited in acceptability; include 1 or 2 items; revise or discard	RETAIN
	EE	11	3	14	0						
	TOTAL	24	6	43	4						

Item No.	Group	Options				P(ECE)	P(EE)	Pt	Remarks for Pt	Remarks	Judgment
		A	B	C	D						
86	ECE	8	5	33	3	0.10204	0.10714	0.105	Difficult	Limited in Acceptability; include some	REJECT
	EE	9	3	14	2						
	TOTAL	17	8	47	5						
87	ECE	2	6	33	8	0.16327	0.03571	0.099	Very Difficult	Not acceptable or limited in acceptability; includes 1 or 2 items; revise or discard	RETAIN
	EE	1	5	21	1						
	TOTAL	3	11	54	9						
88	ECE	1	3	26	19	0.02041	0.03571	0.028	Very Difficult	Not acceptable or limited in acceptability; includes 1 or 2 items; revise or discard	REJECT
	EE	1	5	13	9						
	TOTAL	2	8	39	28						
89	ECE	9	11	9	20	0.40816	0.39286	0.401	Moderately Difficult	Very Acceptable; include most, if not all	RETAIN
	EE	0	11	6	11						
	TOTAL	9	22	15	31						
90	ECE	1	24	18	6	0.02041	0.03571	0.028	Very Difficult	Not acceptable or limited in acceptability; includes 1 or 2 items; revise or discard	REJECT
	EE	1	24	3	0						
	TOTAL	2	48	21	6						
91	ECE	35	1	8	5	0.71429	0.82143	0.768	Easy	Limited in Acceptability; include some	RETAIN
	EE	23	2	0	3						
	TOTAL	58	3	8	8						
92	ECE	10	3	33	3	0.06122	0.03571	0.048	Very Difficult	Not acceptable or limited in acceptability; includes 1 or 2 items; revise or discard	REJECT
	EE	7	1	20	0						
	TOTAL	17	4	53	3						
93	ECE	2	4	37	6	0.04082	0.10714	0.074	Very Difficult	Not acceptable or limited in acceptability; includes 1 or 2 items; revise or discard	REJECT
	EE	3	1	20	4						
	TOTAL	5	5	57	10						
94	ECE	3	2	7	37	0.06122	0.03571	0.048	Very Difficult	Not acceptable or limited in acceptability; includes 1 or 2 items; revise or discard	REJECT
	EE	1	3	4	20						
	TOTAL	4	5	11	57						
95	ECE	4	36	7	2	0.73469	0.85714	0.796	Easy	Limited in Acceptability; include some	RETAIN
	EE	3	24	1	0						
	TOTAL	7	60	8	2						

Item No.	Group	Options				P(ECE)	P(EE)	Pt	Remarks for Pt	Remarks	Judgment
		A	B	C	D						
96	ECE	8	8	30	3	0.61224	0.60714	0.61	Moderately Difficult	Very Acceptable; include most, if not all	RETAIN
	EE	4	5	17	2						
	TOTAL	12	13	47	5						
97	ECE	6	4	30	9	0.61224	0.82143	0.717	Easy	Limited in Acceptability; include some	RETAIN
	EE	0	4	23	1						
	TOTAL	6	8	53	10						
98	ECE	7	18	17	7	0.34694	0.42857	0.388	Moderately Difficult	Very Acceptable; include most, if not all	RETAIN
	EE	3	5	12	8						
	TOTAL	10	23	29	15						
99	ECE	2	37	8	2	0.7551	0.78571	0.77	Easy	Limited in Acceptability; include some	RETAIN
	EE	2	22	0	4						
	TOTAL	4	59	8	6						
100	ECE	17	21	7	4	0.34694	0.53571	0.441	Moderately Difficult	Very Acceptable; include most, if not all	RETAIN
	EE	15	7	3	3						
	TOTAL	32	28	10	7						

**Table 5. Percentage composition of items in terms of difficult level**

Difficulty Level	Percent Passing	Item numbers	No. of Items (Actual)	Total No. of Items in the Test (Target)
Very Easy	91 and above		<b>0</b>	<b>2 to 4</b>
Easy	76 to 90	91, 95, 97, 99	<b>4</b>	<b>4 to 5</b>
Moderately Difficult	26 to 75	66, 67, 68, 71, 72, 73, 76, 78, 79, 80, 81, 83, 84, 89, 96, 98, 100	<b>17</b>	<b>18 to 25</b>
Difficult	11 to 25	69, 70, 74, 75, 77, 82, 86	<b>7</b>	<b>4 to 5</b>
Very Difficult	10 and below	85, 87, 88, 90, 92, 93, 94	<b>7</b>	<b>2 to 4</b>

Table 6 showed the percentage distribution of question difficulty. It can be observed that categories “*Moderately Difficult*” and “*Easy*” questions were able to meet the target number of difficulty levels in a test. However, the “*Difficult*” and “*Very Difficult*” categories exceeded the target while category “*Very Easy*” was below the target level. On the other hand, Table 8 highlights the items to be rejected or revised based on the values obtained for discrimination indices. There were eight (8) questions which must be rejected or revised. The complete ranking of 35 test questions is further illustrated in Table 7.

**Table 6. Comparison of actual percentage composition with a desired distribution of difficult levels in a test**

Difficulty Level	Percent Passing	Actual Percent Found in the test	Desired Distribution of Difficulty Levels in a test
Very Easy	91 and above	0/35 = 0%	5 - 10%
Easy	76 to 90	4/35 = 11.43%	10 - 15%
Moderately Difficult	26 to 75	17/35 = 48.57%	50 - 70%
Difficult	11 to 25	7/35 = 20%	10 - 15%
Very Difficult	10 and below	7/35 = 20%	5 - 10%

**Table 7. Items arrangement in increasing difficulty**

Rank	Item No.	Difficulty Level	Discrimination Index	Rank	Item No.	Difficulty Level	Discrimination Index
1	95	Easy	0.795918367	19	83	Moderately Difficult	0.283163265
2	99	Easy	0.770408163	20	72	Moderately Difficult	0.267857143
3	91	Easy	0.767857143	21	71	Moderately Difficult	0.265306122
4	97	Easy	0.716836735	22	77	Difficult	0.18877551
5	96	Moderately Difficult	0.609693878	23	74	Difficult	0.183673469
6	67	Moderately Difficult	0.528061224	24	82	Difficult	0.181122449
7	100	Moderately Difficult	0.441326531	25	70	Difficult	0.155612245
8	81	Moderately Difficult	0.405612245	26	69	Difficult	0.142857143
9	89	Moderately Difficult	0.400510204	27	75	Difficult	0.12244898
10	80	Moderately Difficult	0.395408163	28	86	Difficult	0.104591837
11	98	Moderately Difficult	0.387755102	29	87	Very Difficult	0.099489796
12	66	Moderately Difficult	0.380102041	30	85	Very Difficult	0.084183673
13	84	Moderately Difficult	0.369897959	31	93	Very Difficult	0.073979592
14	76	Moderately Difficult	0.354591837	32	92	Very Difficult	0.048469388
15	78	Moderately Difficult	0.344387755	33	94	Very Difficult	0.048469388
16	68	Moderately Difficult	0.336734694	34	88	Very Difficult	0.028061224
17	79	Moderately Difficult	0.308673469	35	90	Very Difficult	0.028061224
18	73	Moderately Difficult	0.290816327				

**Table 8. Items to be rejected or revised for future use**

Item No.	Difficulty Level	Discrimination Index	Remarks
69	Difficult	0.143	most of the students answered options A, B and C though for a fact the correct answer is D (REJECT)
75	Difficult	0.122	most of the students answered option B though for a fact the correct answer is A (REJECT)
86	Difficult	0.105	most of the students answered option C though for a fact the correct answer is B (REJECT)
88	Very Difficult	0.028	most of the students answered options C and D though for a fact the correct answer is A, only two students were able to answer correctly (REJECT)
90	Very Difficult	0.028	most of the students answered options B and C though for a fact the correct answer is A, only two students were able to answer correctly (REJECT)
92	Very Difficult	0.048	most of the students answered option C though for a fact the correct answer is B, only four students were able to answer correctly (REJECT)
93	Very Difficult	0.074	most of the students answered option C though for a fact the correct answer is A (REJECT)
94	Very Difficult	0.048	most of the students answered option D though for a fact the correct answer is A (REJECT)

## SUMMARY

The main purpose of this study is to assess the Physics qualifying examination for EE and ECE courses for A.Y. 2013 – 2014 by Statistical Item and Option Analysis in LPU-L. The descriptive method and stratified random sampling was used. There were 35 test questions evaluated from two board courses. The proponents had undertaken the study for two months. The percentage composition of items in terms of difficulty level is a concrete manifestation that the test questions are good. However, some items need to be changed making them easier.

On the other hand, when the actual percentage composition was compared with the desired distribution of difficulty levels in a test, it was

found out that the distribution of test questions for “Easy” and “Moderately Difficult” categories are valid.

Moreover, when the items to be retained, rejected or revised were analyzed, it was determined that there were a total of 8 (22.86%) test questions that should be rejected since most of the students favored answering the wrong option. Surprisingly, there were a total of 27 (77.14%) test questions that must be retained since it passed the difficulty and discrimination index measures. This justifies that the qualifying examination for Physics subject needs little modification, considering that most of the questions given were assessed to be valid.

## CONCLUSION

It is important to determine the different kinds of test that should be in line with the purpose. These include, but not limited to, achievement test, aptitude test, diagnostic test, personality test, interest test and IQ test. In making test, we have to do a specification table based on objective and questions that should have content – validity. The validity of content is measured by its alignment with the course syllabus and qualitative and quantitative judgment. The test specification table will let you see which content is given best importance.

In doing test, one must consider the most important topics for which the teacher will pick more questions. He or she must avoid using “Miscellaneous or Others” questions. Also, questions should be arranged in order of difficulty. They should be categorized. Questions which are very easy and very difficult do not have discrimination power; they should be minimized.

With respect to the results of the study, faculty members of LPU-Laguna must be required to undergo series of trainings pertaining to effective course syllabi and test construction. Based on statistics, it could be concluded that there is a need for improvement in terms of gathering sufficient number of questions that would fit the focal topics and classifications of test such as knowledge, comprehension, application, analysis, synthesis and evaluation.

## **RECOMMENDATION**

In lieu of abovementioned findings and conclusions, the proponents are prompted to formalize their recommendations into two parts: those based on the research findings/data of the study, and those that will grow out of the study, requiring further related studies.

### **Recommendation based on findings/data of the study**

It is deemed that the effectiveness of test questionnaire is accurately measured through Item and Option Analysis. This requires a lot of effort before the teacher could gather desirable test questions based on statistics. Teachers must consider the first step in test construction, which is to draw a table of test specifications. It is essential in formulating test items with regard to a prior plan. Without the aid of specification table, there is no way to check if the best items that were constructed are sufficient in number or not, whether or not, they measure the totality of subject matters and skills that are supposed to be measured.

It is not advisable to simply construct test questionnaires, check, discuss and distribute them to students. It must be evaluated and analyzed. The teachers should be opened to criticisms and improvements on their test construction for further improvement and development.

## **Recommendation beyond the context of the study**

This study on the assessment of Physics qualifying examination for A.Y. 2013 – 2014 by Statistical Item and Option will serve as reference and concrete material for upcoming assessment of test questionnaires within LPU-L premises. Ergo, some teachers on their studies will have to use it in further improving their teaching crafts. Other researchers may also use this for test measurement purposes.

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