Predictors of performance in the licensure examination for agriculturists (LEA) in Western Mindanao State University

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ABSTRACT

Success of graduates in the Licensure Examination for Agriculturists (LEA) presents a tangible confirmation of the instructional quality in an HEI. This retrospective, ex post facto study (N=216) investigated predictors of first attempt success in the LEA among Agriculture graduates of Western Mindanao State University (WMSU). Non-academic and academic variables were selected after exhaustive literature review centered on licensure examinations. Unfortunately, there is a need to fill the research gap as far as LEA success predictors are concerned. Heider's Attribution Theory and Shewhart's Theory of Prediction contextualized success of WMSU College of Agriculture graduates in the LEA. This study determined the gender, degree program, length of time between graduation and examination, Overall Ability Percentile Rating (OAPR), General Weighted Average (GWA) in English, Mathematics, Crop Science, Soil Science, Crop Protection, Animal Science, Agricultural Economics and Marketing, Agricultural Extension and Communication, and performance in the LEA (pass/fail). The study revealed the predictors and determined the binary logistic regression model: Likelihood of success in the LEA log (p/1-p) = -0.12 (Gender) + 0.35 (Degree program) – 0.02 (Length of time between graduation and examination)+ 0.70 (Overall ability percentile rating) + 0.60 (English GWA) + 0.76 (Mathematics GWA) – 0.16 (Crop Science GWA) – 2.00 (Soil Science GWA) - 0.72 (Crop Protection GWA) – 0.18 (Animal Science GWA) – 1.04 (Agricultural Economics and Marketing GWA) – 0.06 (Agricultural Extension and Communication GWA) + 0.30. The research also revealed that OAPR and Soil Science GWA are good predictors. These outcomes may serve as baseline information that will enhance and modify existing admission policies. Remediation and curriculum development among others are suggested as a result of the current study.

Keywords: predictors, performance, licensure examination, agriculture

I. INTRODUCTION

Agriculture is widely acknowledged as the mother of all industries and the maintainer of human life. Very recently, the Commission on Higher Education (CHED, 2014) has positioned Agriculture as a priority program for incoming college students. With an economy heavily dependent on agriculture, the Philippines has experienced continuous shortages due to rapid increase in the population. This necessitates a transformation in the agricultural sector by beefing up its human resources. During the second Philippine Association of Agriculturists Inc. National Convention last 2014, the focus was on the professionalization of agriculturists to welcome the ASEAN economic integration. The inception of the ASEAN Economic Community (AEC) came as a response to make the region competitive in the world economy and resilient in the face of free flowing capital, goods and services, investment opportunities, and skilled labor force. In building the AEC, involvement of the private sector, professional qualifications, and human resources should be scaled up.

One strategy for professionalizing the agriculture sector is the Licensure Examination for Agriculturists (LEA). As stipulated in the Agriculture and Fisheries Modernization Act or RA 8435 Title 2 (Human Resource Development) Section 75, a Board of Agriculture must be constituted as a governing body in the licensure examination (Professional Regulation Commission,

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2000). Since evaluating bodies are more interested in outputs, LEA performance is a "primary instrument of institutional evaluation" under RA 8435 or National Agriculture and Fisheries Education System (NAFES). First implemented in 2003, LEA serves as a standardized evaluation tool to identify Agriculture graduates who are academically and technically fit to be admitted in the agricultural profession. The three-day examination consists of multiple choice type questions 100 items each in the following component subjects: Crop Science, Soil Science, Crop Protection, Animal Science, Agricultural Economics and Marketing, and Agricultural Extension and Communication. The passing general average rating for LEA is 75%.

The performance of State Universities and Colleges (SUCs) offering agricultural courses is best measured in terms of the passing rate in the LEA. To ensure quality and excellent agriculture education in the region, Western Mindanao State University College of Agriculture (WMSU-CA) is voluntarily submitting to accreditation through the Accrediting Agency of Chartered Colleges and Universities in the Philippines (AACUP). As accustomed, AACUP closely monitors this performance indicator in leveling up agricultural institutions and their programs. The result of licensure examinations indicates whether quality education is provided by the institution and becomes a source of pride suggestive of the educational reforms and adherence to quality standards (Parinas & Obrero, 2012). Majority of educational research experts acknowledge that secondary and tertiary level academic performance could be a determinant of licensure examination performance. This is why SUCs impose strict admission and retention policies by implementing student selectivity criteria. For example, students with academic performance below the minimum standards for the program are culled (Aquino & Balilla, 2015).

Performance assessment in the LEA from 2003-2010 showed that 18,606 graduates took the licensure examination all over the country but only 30.16% passed or an average of 701 annually. Moreover, 44% of CHED-recognized agricultural Higher Education Institutions (HEIs) failed to produce LEA passers. While CHED has prescribed ten basic LEA courses (two Crop Science, Animal Science, Soil Science, Crop Protection subjects each and one for Agricultural Economics and Marketing and Extension and Communication), HEIs are not strict with their compliance towards this directive (De Castro, 2014). In WMSU-CA, there have been a number of LEA board passers since 2009. Sadly, its yearly passing rate is below the national passing percentage. Looking seven years back, the passing percentage is between 15.56% and 28.95%. This trend signifies that not all Bachelor of Science in Agriculture (BSA), Bachelor in Agricultural Technology (BAT), and Bachelor of Science in Agribusiness (BSAB) graduates successfully passed the LEA. This led to questions such as factors that could possibly account for the performance of WMSU in the LEA.

Although data are available, however, these were not analyzed to improve LEA performance. Analyzing the data will provide information to the administration and staff by understanding which among the factors is the best performance predictor. This will provide insights towards developing innovative action plans and interventions for the enhancement of the University's agriculture programs. This research is purposely conducted to extract information that will serve as basis for the action plan grounded from research findings.

II. THEORETICAL FRAMEWORK

This research laid its theoretical foundation on Heider's Attribution Theory subsequently refined by Orvis, Cummingham, and Kelly (1975) and Deci (1975). Fundamental to inquiry is asking and responding to "why" questions so the cause of something could be figured out. The Attribution Theory (Manusov & Spitzberg, nd) describes and explains the communicative and mental processes surrounding daily explanations. This theory mirrors a logical-empirical framework. Individuals are like inexperienced scientists as they investigate their social domains in a more systematic way and people actively interpret life events by utilizing logical and consistent sense-making with regard to their interpretations. Causal locus of an action is Heider's prime concern. His work focused on when an individual more possibly considers the cause of behavior as internal (characteristic or disposition of the person) or external (environmental factor) to another person. As stated in the theory, personal and environment factors explain the occurrence of life events. At the heart of the Attribution Theory is the affirmation that individuals perceive significant life events as the interpretation of human work that causal explanations are deeply rooted in factors intrinsic and extrinsic to the person (Mateo, 1998). Simply put, graduates may pass or fail owing to factors that originate from themselves or the environment. In the context of the study, these factors may be non-academic and academic. The research also subscribed to the Forecasting Theory in which the intent is not forecasting but rather enhancing how forecasting processes of failures and successes are understood (Clemen, 1989). The accuracy of forecast may be improved by conducting multiple forecasts and combining its outcomes (Clemen, 1989). Using this approach, data needs to be regularly collected so that it

is possible to update forecast models (Ortuzar, & Garrido, 1994). Non-academic and academic variables were obtained to establish forecast model in passing the LEA from 2009 to 2015.

III. METHODOLOGY

The study employed data mining and ex post facto research design since it entailed analysis of existing data in terms of both non-academic and academic variables and performance of WMSU CA graduates in the LEA from 2009 to 2015. This research setting is selected as this is the only institution in Zamboanga City that offers agricultural degree programs and hence could provide the needed data in the study. Gay (1976) as cited in Sevilla, Ochave, Punzalan, Regala, and Uriarte (1992) explained ex post facto etymologically indicates "from after the fact" wherein the research is interested in finding out the reason or cause that would account for variations in the status or behavior of individuals. In addition, Kerlinger (1973) as cited in Sevilla et al. (1992) clearly defined ex post facto or causal comparative design as "systematic empirical inquiry in which the scientist does not have direct control of independent variables because their manifestations have already occurred or because they are inherently not manipulative".

The research involved comparison of two groups- LEA passers and non-passers on a set of endogenous variables while attributes that discriminate them are referred to as exogenous variables. It is also retrospective in nature which makes it ideal in comparing data taken from WMSU and PRC. Polit and Beck (2008) and Creswell (2012) defined retrospective studies as involving the measurements of current situations that may be correlated significantly with past events.

Study participants were accepted into three programs in the College of Agriculture, Western Mindanao State University in Zamboanga City. Non-academic and academic records were collected, analyzed, and interpreted for the inclusion requirements in the present study. The inclusion criteria covered graduates with verifiable LEA results and bonafide graduates of any of these LEA degree programs offered in WMSU-CA in San Ramon: BSA, BSAB, and BAT. Board examination data covered seven years from 2009 to 2015.

There are a total of 216 first-time takers of LEA in WMSU-CA covering seven years from 2009 to 2015 as presented in Table 3.

As shown, several graduates of WMSU CA took the licensure examination in 2015 while very few in 2011 at 28.24% and 3.70%, respectively. For uniformity and consistency, re-takers were excluded in the sample. To satisfy the data requirements of Binary Logistic Regression, total enumeration was done.

Before conduct of the study, permission was secured from the Office of the University President after approval of research proposal by the Oral Examination Panel. Another letter was addressed to the Officer-In-Charge of WMSU Testing and Evaluation Center, Registrar, and Professional Regulation Commission stating the intention of the investigator to retrieve WMSU CET, subject grades, and LEA ratings, respectively. In the study, GWA in general education and LEA subjects were obtained. General education (GE) focused on basic English Communication and Mathematics. The LEA subjects consisted of Crop Science, Soil Science, Crop Protection, Animal Science, Agricultural Economics and Marketing, and Agricultural Extension and Communication. The researcher personally explained and discussed the details of the study. Gathered data were entered into the computer system then subjected to the appropriate statistical techniques.

Initially, collected data were screened and checked. If pieces of information were missing particularly overall ability percentile rating and grades in specific LEA subjects, respondent is omitted from analysis. After data screening and checking, descriptive and inferential statistics for all variables were calculated and reported. In describing non-academic indicators of target population, frequency and percentage were computed. Means and standard deviations were also computed since data are of interval scale. Binary logistic regression was used to predict which non-academic and academic factors determine performance of WMSU-CA graduates in the LEA from 2009 to 2015.

The model is $p|x = \beta 0 + \beta 1x1 + \cdots + \beta pxp$. Logistic regression is guided by the following assumptions: (a) Since it assumes p(y=1) is the probability of event occurrence, the dichotomous outcome variable must be coded appropriately with values of either 0 or 1; (b) It is necessary that the model should display no or little multicollinearity; thus, independent variables must be independent of each other; (c) It is required that every observation must be mutually exclusive and independent; (d) Regression model should include all relevant factors and none of the irrelevant ones; and (e) Sample size for logistic regression should meet the minimum requirement. Workers recommend a minimum of 30 cases per parameter for estimation when using Logistic Regression (Aldrich & Nelson, 1986; Agresti, 2007 as cited in Fortier, 2010). In Stoltzfus (2011), minimum ratio of samples to independent variable is 10:1.

In the interpretation of data, logistic regression would

utilize other statistical tools such as the omnibus test of model coefficients (Chi-square test, degrees of freedom, and significance), maximum likelihood, odds ratio, Wald, Cox and Snell and Nagelkerke R squares: (a) Chi-square (X2) is used to determine whether collected data is distributed in such a way that it matches established probability distribution. It is computed by dividing the sum of squares and expected values; (b) Maximum likelihood is reported as likelihood-ratio test (logit(p) = log(p/(1-p)). This maximizes probability in obtaining experimental results vis-à-vis the regression coefficients fitted in the model; (c) Odds ratio is a means of establishing whether probability of specific event is similar across groups. If an odds ratio equivalent to 1 is obtained, probability that an event will take place is the same in both groups. An odds ratio that exceeds 1 means that a particular event will more likely occur in the first group and if lesser than 1, less likely to take place in the first group; (d) Wald is a sequential test of hypothesis to ascertain joint significance of coefficients; (e) Cox and Snell R2 fits the statistical model to collected data and provides estimates for its parameters; and (f) In generating statistical models based on a number of observations, Nagelkerke R2 can predict future events using other relevant information. This coefficient indicates the data set's variability proportion that can be attributed to the regression model. Likewise, it measures how well future events may be predicted by said model.

Logistic regression is the appropriate statistical tool to address the main objective of this study since it computes odd ratios that indicate likelihood of occurrence by non-occurrence in each factor (Burns & Grove, 2005 as cited in Fortier, 2010). In the present study, regression used the enter method which inputs the entire range of variables in the model whether they relate significantly to the outcome variable or not. Generally, this procedure is preferred when constructing a model based on established theories.

One of the most common methods to solve for Binary Classification is called Logistic Regression. The goal of Logistic Regression is to evaluate the probability of a discrete outcome occurring, and in this study the LEA performance which is based on a set of past inputs and outcomes: Length of time between graduation and examination, Overall ability percentile rank, English GWA, Mathematics GWA, Crop Science GWA, Soil Science GWA, Crop Protection GWA, Animal Science GWA, and Agricultural Economics and Marketing GWA. But in Binary Classification we're trying to distinguish between just two discrete classes. In such a scenario, it's more helpful to predict the probability of the outcome, than the discrete outcome itself. The goal of Binary Classification is thus to find a model that can best predict the probability of a discrete outcome (notated as 1 or 0, for the "positive" or "negative" classes), based on a set of explanatory input features related to that outcome.

Logistic Regression allows us to compute this probability based on a function:

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Logistic Regression allows us to compute this probability based on a function:

$$P(1) = \frac{1}{1 + e^{-(\theta_0 + \theta_1 * x_1 + \theta_2 * x_2)}}$$

Binary logistic regression addresses the overarching problem in the study at α=0.05. The objective of this statistical tool is to determine the relationship dichotomous variable (performance in the LEA) has with multiple independent variables. Most researchers prefer logistic regression since its assumptions show greater flexibility and can analyze both categorical and continuous variables. Predictors need not exhibit normal distribution, linear relationship or homogeneity of variance within groups (Tabachnick & Fidell 1996). Categorical attributes of LEA takers were recorded and target value is performance of WMSU-CA graduate in the LEA coded 0 for non-passer and 1 for passer. The output of the regression analysis is a model of the probability of success in the LEA. Success was defined by the code 1 and $p|x$ represents the likelihood of passing, given predictor variables. The model for regression is computed from $p|x = \beta0 + \beta1x1 + \cdots + \beta pxp$; thus, there is a linear probability for success among predictors (Simonoff, 2014).

IV. RESULTS

A total of 216 respondents constituted the final cohort in the study. Of the 216, 136 or 63.00% are females and 80 or 37.00% are males. Almost half of the examinees took BS Agriculture (n=100; 46.30%) at WMSU-CA, followed by B Agricultural Technology (n=62; 28.70%), and BS Agribusiness (n=54; 25.00%). Modal time between graduation and examination is less than a year with 60.20%.

As stipulated in the University Code, any student wanting to enter WMSU should take the West Mindanao State University College of Engineering and Technology (WMSU CET) to gauge his or her aptitude. An Overall Ability Percentile Rank is reported along with ratings in the five subtests which are: Reading Comprehension, English Proficiency, Science Process Skills, Quantitative Skills, and Logical Thinking Skills. Logical Thinking Skills obtains the highest average percentile rank at 60.33 (SD=24.81) while quantitative skills gets the lowest mean at 40.52 (SD=23.94). This indicates that in Logical Thinking Skills close to 40% of incoming freshmen have scores above the performance of LEA takers in 2009 to 2015. With regard to Quantitative Skills, 59.48% of CET examinees have higher scores than the WMSU CA freshmen who eventually took the LEA from 2009 to 2015.

Rating scheme of student academic performance varies from one HEI to another. Grade weighted average (GWA) is an index representing the general scholastic achievement of students used during evaluation. In computing GWA, grades earned in subjects prescribed by the curriculum must be averaged. In WMSU, grades are scaled from 1.00 to 5.00 at intervals of 0.25; 1.00 being excellent, 5.00, failed, and 3.00, the lowest passing grade. Majority of GWAs is adjectivally rated Good which means that student grades in almost all subjects may either be 2.00 or 2.25. Subject-wise, GWA is highest in Crop Science ($\bar{x}$=2.14; SD=0.42) while lowest in Mathematics ($\bar{x}$=2.58; SD=0.56).

Ratings in the LEA demonstrate that the top three lowest scores are in Crop Science ($\bar{x}$=64.51; SD=10.83), Crop Protection ($\bar{x}$=65.18; SD=11.07), and Soil Science ($\bar{x}$=65.52; SD=12.69). It can also be gleaned that Agricultural Economics and Marketing ($\bar{x}$=69.21; SD=9.34), Agricultural Extension and Communication ($\bar{x}$=67.21; SD=10.44), and Animal Science ($\bar{x}$=66.64; SD=10.19) received higher ratings. Apparently, the results contradict with Simon and Quilang (2012). In their study, mean ratings were highest in Crop Protection, Animal Science, and Crop Science. Lowest was in Agricultural Economics and Marketing. In WMSU-CA, ratings were all below the cut-off of 75 across all subjects.

The non-academic and academic independent variables that significantly contribute to the success in the LEA among first takers from 2009 to 2015 were determined. Binary Logistic Regression determined predictability of passing the licensure examination for the first time. To address this overarching research problem, both non-academic and academic variables were loaded into the regression model using the enter method. Prior to this, a Point Biserial Correlation was conducted to find out significant correlates of LEA performance in WMSU-CA graduates.

Table 1
Number of first takers in the LEA from 2009 to 2015 of WMSU-CA

Year	f	%
2009	20	9.26
2010	23	10.65
2011	8	3.70
2012	22	10.19
2013	28	12.96
2014	54	25.00
2015	61	28.24
Total:	216	100.00

Source: Professional Regulation Commission (2015)

Table 2
Point Biserial Correlation to Determine Correlates of Performance in the LEA from 2009 to 2015

Variables	n	Correlation Coefficient	p
Length of time between graduation and examination	216	0.05	0.47^{ns}
Overall ability percentile rank	189	0.44	0.00^{*}
English GWA	212	0.21	0.00^{*}
Mathematics GWA	212	-0.26	0.00^{*}
Crop Science GWA	212	-0.34	0.00^{*}
Soil Science GWA	211	-0.35	0.00^{*}
Crop Protection GWA	207	-0.40	0.00^{*}
Animal Science GWA	212	-0.39	0.00^{*}
Agricultural Economics and Marketing GWA	207	-0.37	0.00^{*}
Agricultural Extension and Communication GWA	188	-0.24	0.00^{*}

ns – not significant at 5% level of significance
* significant at 5% level of significance
Sample sizes reflect valid cases after data screening

There is reason not to believe the popular notion that the more graduates delay their board examination, the more their chances of success get lower as shown in Table 2 for the case of WMSU-CA graduates. The correlation coefficient indicates a negligible relationship (rpb=0.05; p>0.05) between length of time between graduation and examination and performance in the LEA coded 0 for fail and 1 for pass. However, WMSU-CET overall ability percentile rating (rpb=0.44; p<0.05), GWA in English (rpb=-0.21; p<0.05), Mathematics (rpb=-0.26; p<0.05), Crop Science (rpb=-0.34; p<0.05), Soil Science (rpb=-0.35; p<0.05), Crop Protection (rpb=-0.40; p<0.05), Animal Science (rpb=-0.39; p<0.05), Agricultural Economics and Marketing (rpb=-0.37; p<0.05), and Agricultural Extension and Communication (rpb=-0.24; p<0.05) are significant correlates.

As mentioned, the population composed of 216 WMSU-CA graduates, is involved in the study. Of this number, only 171 observations are subjected to Binary

Logistic Regression. The remaining 45 are not included due to lack of information in at least one variable. From the 171, 48 or 28.07% passed the LEA while 123 or 71.93% failed. The analysis tested whether selected non-academic and academic variables are predictors of examination outcomes. The significance of the regression model can be determined from the Sig value in the Omnibus test of model coefficients (Table 3).

Table 3
Omnibus Tests of Model Coefficients

		Chi-square	df	p
Step 1	Step	68.29	12	0.00*
	Block	68.29	12	0.00*
	Model	68.29	12	0.00*

* significant at 5% level of significance

The Omnibus Test of Model Coefficients test positively for statistical significance (X2=68.29, df=12, p=0.00).

Table 4
Model Summary

Step	-2 Log likelihood	Cox & Snell r^2	Nagelkerke r^2
1	134.72[a]	0.33	0.47

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

The -2 Log likelihood value is 134.72 for the overall evaluation of this model. The Cox and Snell R2 and Nagelkerke R2 of 0.33 and 0.47 respectively indicates that between 33% and 47% of the variance in performance could be accounted for by differences in gender, degree program, length of time between graduation and examination, overall ability percentile rating, GWA in English, Mathematics, Crop Science, Soil Science, Crop Protection, Animal Science, Agricultural Economics and Marketing, and Agricultural Extension and Communication. The indices show a moderate relationship between prediction and grouping. The other 67% and 53% of the variance in performance may be explained by factors not investigated in the study for instance attendance in review classes, level of preparation examinees have physically, emotionally and mentally, physical state of testing centers, as well as HEIs' institutional and instructional profile.

Table 5
Classification Table[a]

Observed			Predicted		
			Performance		% Correct
			Failed	*Passed*	
Step 1	Performance	*Failed*	111	12	90.20
		Passed	21	27	56.30
				Overall %	80.70

a. The cut value is .500

The Classification Table shows that 90.20% of examinees who failed in the LEA for the first time are correctly predicted. Among those who passed, however, the model is able to predict 56.30% correctly. Overall, the percentage of correct prediction is 80.70%.

Table 6
Variables in the Equation

		B	S.E.	Wald	df	p	Exp (B)
Step 1[a]	Gender	-0.12	0.49	0.06	1	0.81[ns]	0.89
	Course	0.35	0.32	1.20	1	0.27[ns]	1.42
	Length of time between graduation and examination	-0.02	0.13	0.03	1	0.87[ns]	0.98
	Overall ability percentile rating	0.07	0.02	20.75	1	0.00*	1.07
	English GWA	0.60	0.60	1.00	1	0.32[ns]	1.83
	Mathematics GWA	0.76	0.50	2.32	1	0.13[ns]	2.13
	Crop Science GWA	-0.16	0.92	0.03	1	0.87[ns]	0.86
	Soil Science GWA	-2.00	0.71	7.99	1	0.01*	0.14
	Crop Protection GWA	-0.72	0.80	0.81	1	0.37[ns]	0.49
	Animal Science GWA	-0.18	0.84	0.04	1	0.84[ns]	0.84
	Agricultural Economics and Marketing GWA	-1.04	0.65	2.56	1	0.11[ns]	0.35
	Agricultural Extension and Communication GWA	-0.06	0.56	0.01	1	0.91[ns]	0.94
	Constant	0.30	2.26	0.02	1	0.89[ns]	1.35

a. Variable(s) entered on step 1: Course, Gender, Length of time between graduation and examination, Overall ability percentile rating, English GWA, Mathematics GWA, Crop Science GWA, Soil Science GWA, Crop Protection GWA, Animal Science GWA, Agricultural Economics and Marketing GWA, Agricultural Extension and Communication GWA.
ns- not significant at 5% level of significance
* significant at 5% level of significance

The regression model is: Likelihood of success in the LEA log (p/1-p) = -0.12 (Gender) + 0.35 (Degree program) – 0.02 (Length of time between graduation and examination)+ 0.70 (Overall ability percentile rating) + 0.60 (English GWA) + 0.76 (Mathematics GWA) – 0.16 (Crop Science GWA) – 2.00 (Soil Science GWA) - 0.72 (Crop Protection GWA) – 0.18 (Animal Science GWA) – 1.04 (Agricultural Economics and Marketing GWA) – 0.06 (Agricultural Extension and Communication GWA) + 0.30. The Wald ratio for gender demonstrates no statistical significance, X2 (df=1) = 0.06, p= 0.81. For course and length of time between graduation and examination, the Wald ratios are not significant at X2(df=1) = 1.20 and X2 (df=1) = 0.03, respectively. Among academic variables, non-significant Wald ratios are obtained in English (X2=1.00, p=0.32), Mathematics (X2=2.32, p=0.13), Crop Science (X2=0.03, p=0.87), Crop Protection (X2=0.81, p=0.37), Animal Science (X2=0.04, p=0.84), Agricultural Economics and Marketing (X2=2.56, p=0.11), and Agricultural Extension and Communication

(X2=0.01, p=0.91). Only overall ability percentile rating (OAPR) (X2=20.75, p=0.00) and Soil Science (X2=7.99, p=0.01) are predictive of LEA performance.

In Binary Logistic Regression, the most important and meaningful information is the EXP(B) which is the estimate of the odds ratio. The odds ratio is the odds that a specific event might occur (Allison, 1999 as cited in Alden, 2008). In the predictive model developed, the odds ratio is the odds of passing LEA in the first attempt. When odds ratio is greater than one, it means higher likelihood of passing whereas lesser than one indicates decrease that dependent variable is one. Since the EXP(B) for OAPR exceed 1 (1.07), the value indicates that when OAPR increases by one percent, the odds ratio increases by 1.07 times for each percent of OAPR. Because for Soil Science EXP(B) is below 1 (0.14), whenever there is an increase in the numerical grade, odds of the outcome drops.

V. DISCUSSION

The typical LEA taker from 2009 to 2015 is a female and earned a BS Agriculture degree. Distribution by gender and degree program generally mirror enrolment and graduation trends across years. Apparently, it is a common practice to immediately take the LEA two to three months after graduation. Incidentally, the 2009-2013 board examinations were usually administered in July while June in the last two board years (2014, 2015). This would provide first-time passers and fresh graduates better chances of tenured employment at the Department of Agriculture.

Admission ratings demonstrate WMSU-CA students should be provided more activities that target higher order thinking skills. Additionally, OAPR strongly points that the alumni-respondents belong to the lower bound of the WMSU-CET passers. At WMSU-CA, the admission policy does not warrant a stringent selection process as it may discourage prospective students from enrolling in the College. Scholastic standing in general education and basic LEA subjects was taken since GWA is a concrete measurement tool that effectively quantifies the learning students gained in college. It likewise provides a lucid representation on whether or not student's achievement and academic performance have attained minimum requisite standards (Balmeo, 2003 as cited in Quiambao, Baking, Buenviaje, Nuqui, & Cruz, 2015). Using the WMSU grading scheme, academic performance of respondents is average.

Clearly, descriptive statistics of performance in the 2009-2015 LEA implies a need to institute significant reforms in agricultural education at WMSU-CA. Increasing the number of first-time passers is a tall order for the administration and faculty because of the multifaceted nature of failure in licensure examinations. Forones (2012) reasoned that mismatch or incongruence between lessons in undergraduate degree programs and actual items in the licensure examination might have contributed to the failure. Carr (2011) cited curricular gaps, attitudes of students on taking LEA, late examination after program completion, and insufficiency in preparation. Employment appears to impede passing according to Griffiths et al. (2004) as cited by Rosales, Arugay, Divinagracia, and Palaganas (2014). Tabbal, Rico, and Canapi (nd) attributed failure to faculty, curriculum, laboratory, administration, and examinee characteristics.

Academic performance or GWA as a significant predictor, in general, emphasizes the importance of the academic preparedness students acquired through curriculum and instruction. During their first two years, they must have gained specific competencies they later mastered during the junior and senior years. This goes to show that when students are investing their energies in earning good grades, they will successfully pass the licensure examination. Navarro et al (2011) affirmatively confirmed the results. Point biserial correlation treats GWA per subject a single factor not in combination with other subject areas. The relatedness of subjects to LEA success demonstrates consistency in the curriculum; students earning higher grades have a greater chance of passing the licensure examination.

The logistic regression model is statistically significant suggesting that observed outcomes in LEA performance can be predicted by both non-academic and academic independent variables. The p value (0.00) points out that one coefficient at the minimum, is unequal to 0 and that the obtained model is significantly different from the model where only the constant is loaded. Gender, degree program, and length of time between graduation and examination did not significantly determine LEA success which confirms Fortier (2010), Ramos, Ananoria, and Nera (2012), and Ari, Atalay, and Aljamhan (2010) while disagrees Yim (2015), Figuerres (2012), and Momany (2013).

In Carroll (1989) as cited in Reynolds, Creemers, Nesselrodt, Schaffer, Stringfield, and Teddlie (1994), there are five rudiments of effective instruction. First, the general aptitude of students, as shown in the results of entrance examinations, determines their readiness to enter degree programs offered in the University. Second is the student's level of understanding instruction. This represents how extensive students know prerequisite information and skills necessary to comprehend units of instruction which is manifested by performance in two General (English, Mathematics) and six Agriculture (Crop Science, Soil Science, Crop Protection, Animal Science, Agricultural Economics and

Marketing, Agricultural Extension and Communication) subjects. Concepts in these subjects transition from being elementary to being complex; the 101 subjects serve as prerequisites of 102 subjects.

Very obvious is the significant predictive contribution of admission rating to the regression model. The results are consistent with Pascua and Navalta (2011), Guanzon and Marpa (2014), Arenillo and Arenillo (2009), Gerundio and Balagtas (2014), Truman (2012), and Daley et al (2003). Garcia (2013) did not confer with this trend. This could be explained by the congruence of the admission examination content and objectives with LEA subjects. Much of cited literature has indicated that GWA is a contributing factor to success in licensure examinations. The study serves as additional evidence to the claim of Tanada and Sotelo (nd), Ong, Palompon, and Banico (2012), Neri (2009), Castillo (2011) among others. However, it is only in Soil Science, which means that program advisers should pay close attention to this subject.

VI. Conclusion

First-time success rate in licensure examinations is proof of the quality of education in HEIs. Entry into the Department of Agriculture (DA) is tenable once applicants become registered agriculturists by passing the LEA. Sadly, WMSU-CA, like other schools in the country, lags behind since passing rates are below the national passing rate. This implies that students have poorly grasped what the concepts mean in real-life situations. Corroborating this observation are the unsatisfactory ratings in the six component subjects being below the cut-off of 75. The binary logistic regression model indicates that LEA success is significantly defined by OAPR and Soil Science GWA. Therefore, there should be educational interventions in place designed to increase probability of passing the LEA as early as first year. The University's College of Agriculture stands as a direct beneficiary of this completed study which aimed to establish non-academic and academic predictors of LEA performance. The following recommendations are presented with specific reference to empirical data the study has collected:

Policy. The College of Agriculture should revisit its minimum admission percentage of less than 50% in WMSU-CET; thus, admission policy should be more strict and stringent in order to produce board-material graduates. Retention policy in the College of Agriculture should be restudied and strictly imposed to guarantee that only the scholastically prepared take the LEA. WMSU administrators may draft a policy increasing the passing rate of 55% to 60%. WMSU-CA alumni may enroll in review classes and refresher courses for a minimal fee. If this is not do-able, in-house review may be integrated into the curricula of LEA degree programs. They may or may not enroll in review classes after completing their respective degrees.

Quality Assurance. Monitoring course performance of WMSU-CA students should be conducted early and regularly so that at-risk students are identified utilizing the established Binary Regression Model. This way, necessary support systems can be laid out across various stages in each degree program. The College of Agriculture should evaluate and enhance classroom instruction most especially in Crop Science since students obtained the lowest general rating in this component subject. There must be a remedial program offered to those who are underperforming in the LEA subjects.

Research. Future predictive studies may explore other variables such as GWA in Science (General Biology, General Chemistry, General Physics), personality and motivational traits test anxiety, test taking techniques, etc. It is likewise proposed to conduct phenomenological studies that document the experiences of WMSU-CA graduates in taking the LEA.

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References

Aquino, A. & Balilla, L. (2015). Pre-service Teachers' Licensure Examination plans and content knowledge. *Asia Pacific Journal of Education, Arts and Sciences*, 2(2), 110-116.

Arenillo, S. A. & Arenillo, M. T. (2009). Preservice education and performances in teacher licensure examination among graduates of Mindoro State College of Agriculture and Technology. *JPAIR Multidisciplinary Journal*, 2(1), 132-143.

Ari, A., Atalay, O. T., & Aljamhan, E. A. (2010). From admission to graduation: the impact of gender on student ac,ademic success in respiratory therapy education. *J Allied Health*, 39(3), 175-178.

Carr, S. M. (2011). NCLEX-RN pass rate peril: One school's journey through curriculum revision, standardized testing, and attitude change. *Journal of Nursing Education Perspectives: Research*, 32(6), 384-388.

Castillo, T. R. (2011). Determinants of success of the Bachelor of Secondary Education Graduates of the Bataan Peninsula State University in the Licensure Examination for Teachers. Retrieved www.bsu.edu.ph.

CHED. (2014). *CHED Priority Courses for AY 2014-2015 to AY 2017-2018*. Retrieved http://www.ched.gov.ph/wp-content/uploads/2014/05/CMO-01-series-of-2014-CHED-Priority-Courses-for-AY-2014-2015-to-AY-2017-20181.pdf.

Clemen, R. (1989). Combining forecasts: a review and annotated bibliography. *International Journal of Forecasting*, 5(4), 559-581.

Creswell, J. W. (2012). *Qualitative inquiry and research design: Choosing among the five traditions*. California: Sage.

Daley, L., Kirkpatrick, B., Frazier, S., Chung, M., & Moser, D. (2003). Predictors of NCLEX-RN success in a baccalaureate nursing program as a foundation for remediation. *Journal of Nursing Education*, 42(9), 390-398.

Deci, E. L. (1975). *Intrinsic motivation*. New York: Plenum.

Figuerres, O. B. (2012). *An analysis of the performance of the University of Northern Philippines in the Licensure Examination for Teachers.* Unpublished Dissertation. University of Northern Philippines, Vigan, Ilocos Sur.

Forones, A. G. (2012). Engineering Board Examination results: a measure of the predictive influence of the general and professional subjects. *UIC Research Journal*, 8(12), 1-20.

Fortier, M. E. (2010). *Predictors of success of the National Council Licensure Examination for Registered Nurses among transfer BSN students*. Retrieved from http://scholarship.shu.edu/cgi/viewcontent.cgi?article=2368&context=dissertations.

Garcia, G. C. (2013) Academic performance as determinant to pass the Licensure Examination for Teachers. *JPAIR Multidisciplinary Journal*, 2(1), 69-75.

Gerundio, M. G., & Balagtas, M. U. (2014). Exploring formula for success in Teachers' Licensure Examination in the Philippines. *Educational Measurement and Evaluation Review*, 5(1), 104-117.

Guanzon, D. T. P., & Marpa, E. P. (2014). *Philippine Normal University Admission Test and College Grade Point Average as Predictors of Licensure Examination for Teachers*. Retrieved from http://www.researchgate.net/publication/260660938_Licensure_Examination_for_Teachers.

Manusov, V. & Spitzberg, B. (nd). *Attribution Theory*. Retrieved http://www.corwin.com/upm-data/21200_Chapter_3.pdf.

Mateo, R. M. (1998). *Determinants of performance of college faculty in Teacher Educational Institutions in Region I*. Unpublished Dissertation. Mariano Marcos State State University, Laoag City.

Momany, M. T. (2013). The relationship between professional exam performance and certain demographic characteristics of Jordanian CPA candidates. *Global Review of Accounting and Finance*, 4(1), 119-132.

Navarro, R. T., Vitamog, A. T., Tierra, R. J. C., & Gonzales, D. M. J. (2011). Predictors of NLE performance. *JPAIR Multidisciplinary Journal*, 6(1), 232-246.

Neri, D. L. E. (2009). Intellective variables as predictors to NLE performance. *Liceo Journal of Higher Education Research*, 6(1), 56-75.

Ortúzar, J. D. D., & Garrido, R. A. (1994). A practical assessment of stated preferences methods. *Transportation*, 21(3), 289-305.

Ong, M. B. & Palompon, D. R. (2012). Predictors of Nurses' Licensure Examination performance of graduates in Cebu Normal University, Philippines. *Asian Journal of Health*, 2(1), 130-141.

Orvis, B., Cunningham, J., & Kelley, H. (1975). A closer examination of causal inference: the roles of consensus, distinctiveness, and consistency information. *Journal of Personality and Social Psychology*, 32(4), 605-616.

Parinas, M., & Obrero, R. (2012). Relevance of the topics in the Criminologist Licensure Examination Review Program of the University of Northern Philippines. *UNP Research Journal*, 21(1), 96-109.

Pascua, J. B., & Navalta, J. D. (2011). Determinants of LET performance of the teacher education graduates in a state university. *JPAIR Multidisciplinary Journa,l* 6(1), 90-102.

Polit, D. F., & Beck, C. T. (2008). *Nursing research: generating and assessing evidence for nursing practice*. Philadelphia: Lippincott Williams and Wilkins.

PRC. (2000). *PRC Resolution No. 2000-663 Series of 2000*. Retrieved from http://www.prc.gov.ph/uploaded/documents/PRC%20RESO%20NO.%202000-663%20AGRICULTURE_e.pdf.

Quiambao, D., Baking, E., Buenviaje, L., Nuqui, A., & Cruz, R. (2015). Predictors of board examination performance of the DHVTSU College of Education graduates. *Journal of Business and Management Studies*, 1(1), 1-4.

Ramos, M. M., Ananoria, A. M., & Nera, C. M. (2012). Factors affecting the performance of library and information professionals in the Librarians' Licensure Examination (LLE) 2006-2010, part 1: age, gender, and type of examinees. *Journal of Philippine Librarianship*, 32: 55-63.

Reynolds, D., Creemers, B., Nesselrodt, P., Schaffer, E., Stringfield, S., & Teddlie, C. (1994). *Advances in school effectiveness: Research and practice.* New York: Elsevier Science Inc.

Rosales, A., Arugay, Y., Divinagracia, C., & Palaganas, E. (2014). Analytical study of the Nurses' Licensure Examination Performance of Graduates of Philippines Colleges of Nursing. *Philippine Journal of Nursing*, 84(1), 4-23.

Sevilla, C., Ochave, J., Punsalan, T., Regala, B., & Uriarte, G. (1992). *Research Methods*. Quezon City: Rex Printing Company Inc.

Stoltzfus, J. C. (2011). Logistic regression: a brief primer. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/21996075.

Tabachnick, B. G. & Fidell, L. S. (1996). *Using multivariate statistics*. New York: Harper Collins.

Tanada, G. T. & Sotelo, D. S. (nd). Predictors of Licensure Examination Performance of TIP Bachelor of Science in Marine Transportation Graduates, Officer-In-Charge level. *TIP Research Journal Manila*, 4(1). Retrieved from http://ejournals.ph/article.php?id=9039.

Truman, J. M. (2012). Identifying predictors of NCLEX-RN success in an Associate Degree Nursing Program. *International Journal of Applied Science and Technology*, 2(7), 37-45.

Yim, M. K. (2015). Exploration of examinees' traits that affect the score of Korean Medical Licensing Examination. *J Educ Eval Health Prof*, 12(5) Retrieved from http://jeehp.org/DOIx.php?id=10.3352/jeehp.2015.12.5.

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