

Discriminant analysis of Social Work's performance in licensure examination

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ABSTRACT

Many research studies have examined academic factors as predictors of success in licensure examination. The purpose of this descriptive discriminant analysis was to explore possible factors in passing social work licensure examination. Data were examined from academic records of 69 (37 passed and 32 failed) Social Work graduates of the University of Mindanao who took Social Work Licensure Examination 2014. This can be used as a basis of Social Work program in planning and administering strategies to improve its national passing rates. Discriminant analysis was employed along five academic factors which are Human Behavior and Social Environment (HBSE), Social Work Programs and Policies (SWPP), Social Work Methods (SWM), Field Practice (FP) and Grade Point Average (GPA). The analysis generated three significant predictors accounting for 76.22% of between group variability. The function had a hit ratio of 100%. Structure matrix revealed that three cluster subjects were identified as good factors of passing the social work licensure examination: HBSE, SWPP and SWM had a correlation value of 0.713, 0.768 and 0.840, respectively.

Keywords: Discriminant Analysis, Licensure Examination, Social Work.

INTRODUCTION

Every college and university sees licensure examination as an important asset to build its name. It has been a vital basis in regulating professional workers in the country. According to (Hertz & Chinn, 2015), licensure examination is one of the last bundles that a candidate must face in the licensing process.

One of the offered undergraduate board programs that universities and colleges here in the country is the degree of Social Work. The program became a recognized profession in the country with the enactment on June 19, 1965 of R.A. No. 4373 also known as the "Act to Regulate the Practice of Social Work & the Operation of Social Work Agencies in the Philippines and for other Purposes".

The Board of Social Work (BSW) under the PRC is tasked to regulate and administer the Social Work education of the country implemented through CHED. Schools will be given sanctions with poor performance in board examination and that is termination or closure of the program if this depreciation continues (Autida, 2010).

The Social Work Licensure Examination of UM in 2010 obtained 52.70 % which is below from the national passing percentage of 58.29 % and stepped up by 20.22 % in 2011 above the national passing percentage of 64.06 % but slipped down at 49.18 % and 47.92 % in 2012 & 2013 respectively. In 2014, SWLE of UM got 54.79 % above the national passing percentage which is 55.56 %. This trend of the passing percentage of the university shows that immediate action is necessary to improve these results.

Improving the result of the passing percentage will be realized such as identifying significant predictors associated with the exam (Borek, 2006), determining relationships of academic and non-academic variables (Burds, 2010). Some researchers include demographic variables as predictors of success in passing the licensure examination (Daley, et al. 2003).

Cluster subjects and subjects included that are relative to the licensure examination may be used as benchmark for the teachers and even the Grade Point Average (GPA) knowing the students' potential in passing the board exam. This may be done with the coordination of school administration to devise some interventions (Tamayo, Bernardo, Eguia, 2014). The University of Mindanao regulates itself through regular curriculum review and revision, facilitates a pre-review that serves as an alternative measure to help students to be more potent in passing the exam. But all of these measures would be nothing without students' effort. Thus, this study tends to determine good predictor variables for success in Social Work Licensure Examination (SWLE) and generate the discriminant model.

The main objective of this study was to determine the strong and weak predictors of success in licensure examination among social work board takers and to formulate a model that will determine the factors that affect the board takers to pass the examination.

METHOD

The researchers used the descriptive discriminant analysis. This quantitative study comes from institutional secondary data to conduct group comparison. The five academic factors which are the human behavior and social environment (HBSE), social work programs and policies (SWPP), social work methods (SWM), field practice (FP) and the grade point average (GPA) emerged from review of related literature variables to determine factors which best discriminate the students who passed and failed the licensure examination. The study focused only on the data obtained from Social Work graduates who took the licensure examination in 2014. The results of this study may not be generalized to other colleges and universities which offered the same program or to all programs. The participants of this study were the UM B.S. Social Work graduates who passed the SWLE and those who failed was acquired. Seventy-three students were initially identified (40 passed and 33 failed). Students whose GPA not readily available were not included in the study. The final sample included 69 (37 passed and 32 failed) UM B.S. Social Work graduates who took the SWLE 2014. The formula for the computation of the mean of the data involved in this study is given by:

$$\bar{X}_1 = \frac{\sum_{i=1}^{69} x_i \cdot 20\%}{69}, \text{ is the mean for HBSE.}$$

$$\bar{X}_2 = \frac{\sum_{i=1}^{69} x_i \cdot 20\%}{69}, \text{ is the mean for SWPP.}$$

$$\bar{X}_3 = \frac{\sum_{i=1}^{69} x_i \cdot 30\%}{69}, \text{ is the mean for SWM.}$$

$$\bar{X}_4 = \frac{\sum_{i=1}^{69} x_i \cdot 30\%}{69}, \text{ is the mean for FP.}$$

$$\bar{X}_5 = \frac{\sum_{i=1}^{69} x_i}{69}, \text{ is the mean for GPA.}$$

Descriptive statistics and multivariate analysis specifically discriminant analysis was used in this study. The discriminant model is given by $D = c + a_1X_1 + a_2X_2 + a_3X_3 + \dots + a_iX_i$

where:

D = discriminant score

a_i = discriminant coefficient or weight of the predictor

X_i = predictor or independent variable

c = constant term

RESULTS & DISCUSSION

Strong and weak predictors of success in licensure examination

Table 1 and Table 2 which are the Group Means and Test of Equality of Group Means or the ANOVA table show whether there are any significant differences between groups. In Table 1, it shows the mean of each academic predictor for the two groups (pass and fail). Using the scale developed by Pachejo & Allaga (2013), students who passed the licensure examination had good GPA while those who failed had fair GPA.

Table 1. Group means

Grouping Variable	Predictors	Mean
Pass	HBSE	14.7027
	SWPP	14.4378
	SWM	22.4432
	FP	24.1946
	GPA	86.1946
Fail	HBSE	11.3188
	SWPP	11.2812
	SWM	17.2313
	FP	21.5063
	GPA	82.8094
Total	HBSE	13.1333
	SWPP	12.9739
	SWM	20.0261
	FP	22.9478
	GPA	84.6246

Table 2 is the Test of Equality of Group Means which reveals the value of Wilk's Lambda of each independent variable and the corresponding F value to test its significance. The table shows that all of the means of each predictor have very significant differences between the groups. The highest Wilk's Lambda presents lowest importance in the discriminant function (Uddin, Meah, Hossain, 2013). Hence, the least important predictor to the discriminant function is GPA and the most important predictor is SWM. The result is exactly supported by the p-value of the F-test. This preliminary test shows also that the study can proceed with the use of discriminant analysis.

Table 2. Test of equality of group means

Predictors	Wilk's Lambda	F	df1	df2	Sig.
HBSE	0.380	109.310	1	67	0.000
SWPP	0.346	126.754	1	67	0.000
SWM	0.307	151.563	1	67	0.000
FP	0.651	35.961	1	67	0.000
GPA	0.752	22.044	1	67	0.000

Table 3 features the Structure Matrix showing the value of canonical loadings which is arranged by showing the predictors as an order of highest importance to lowest importance in determining group memberships. The table shows that SWM is the most important predictor and GPA being the least important. By squaring the value of each predictor, it gives the variance explained by that predictor in the dependent variable. The table also shows that FP and GPA were excluded in the analysis. The exclusion of the GPA was supported by Tamayo (2015), which states that the GPA variable indicates no statistical evidence to influence passing the licensure examination.

Table 3. Structure matrix

Predictors	Function
	1
SWM	0.840
SWPP	0.768
HBSE	0.713
FP ^a	0.500
GPA ^a	0.379

a. Predictors excluded in the analysis

Table 4, shows the value of Standardized Canonical Discriminant Function Coefficients which represents partial correlations or the contribution of a variable to the discriminant function in the context of the other independent variable in the model. The values demonstrate that these three predictors were statistically strong in discriminating between the two groups. For these values, a high value also indicates that the groups differ a lot from these three predictors.

Table 4. Standardized canonical discriminant function coefficients

Predictors	Function
	1
SWM	0.519
SWPP	0.412
HBSE	0.519

Discriminant model

Table 5 presents the Eigenvalues which shows the Eigenvalue associated with the first function which is 3.206 and this function accounts for 100% of the explained variance in the model. The canonical correlation value is 0.873 whose squared is 0.7622 indicative that 76.22% of the variance in the dependent variable (pass and fail) is explained or accounted for by that model. This further explains that the model has the best discriminating ability.

Table 5 Eigenvalue

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	3.206 ^a	100.0	100.0	0.873

a. First 1 canonical discriminant functions were used in the analysis.

Table 6 is the Wilk's Lambda showing the value of Wilk's Lambda accounted by the function. From table 5, the canonical correlation was 0.873 so the Wilk's Lambda is $(1-0.873^2) = 0.238$ indicative of 23.8% of the variance in the grouping variable is not explained by the given academic factors and maybe explained by other factors. This value is transformed to a chi-square of 94.095 with 3 degrees of freedom which is significant beyond 0.05 level with an obtained p value of 0.000. Further, the results indicate that the function discriminates the groups significantly and contributes to group differences (Beeman & Waterhouse, 2001).

Table 6. Wilk's Lambda

Test of Function	Wilk's Lambda	Chi-Square	df	Sig.
1	0.238	94.095	3	0.000

Table 7 presents the Canonical Discriminant Function Coefficient which shows the unstandardized coefficient of the three (3) variables namely: HBSE, SWPP and SWM. These variables were considered to discriminate the two groups (pass and fail) after stepwise discriminant analysis (Haas, Nugent, Rule, 2004). The model

$$D = -13.929 + 0.258X_1 + 0.355X_2 + 0.296 X_3$$

where:

X_1 - HBSE score multiplied by 20%.

X_2 - SWPP score multiplied by 20%.

X_3 - SWM score multiplied by 30%

has been generated to produce the values of discriminating variables. This result also shows that the exclusion of the variables FP and GPA from the function can make the group means of the two-grouping variable (pass and fail) equal after the process of stepwise discriminant analysis. From the model, the mean scores of the students who passed the Social Work Licensure Examination is 1.641 and for those who failed, -1.897. This value shows a large difference between the two groups which only suggests that the model has a better discriminating ability.

Table 7. Canonical discriminant function coefficients (Unstandardized coefficients)

Predictors	Function
	1
HBSE	0.258
SWPP	0.355
SWM	0.296
(Constant)	-13.929

Table 8 shows the results of the cross-validation test to assess the validity of the discriminant analysis conducted. This study correctly identifies two groups of social work board takers with a hit ratio of 100% (Haas, Nugent, Rule, 2004), hence, the analysis sample is stable (Moss, 2016) and the hit ratio is valid for the analysis sample.

Table 8. Classification results

Grouping Variable			Predicted Group Membership		Total
			Pass	Fail	
Original	Count	Pass	37	0	37
		Fail	0	32	32
	%	Pass	100.0	0	100.0
		Fail	0	100.0	100.0
Cross-validated ^a	Count	Pass	37	0	37
		Fail	0	32	32
	%	Pass	100.0	0	100.0
		Fail	0	100.0	100.0

- a. Cross validation is done only for those cases in the analysis. In cross-validation, each case is classified by the functions derived from all cases other than that case.
- b. 100.0% of original grouped cases correctly classified
- c. 100.0% of cross-validated grouped cases correctly classified.

CONCLUSIONS

Only three cluster subjects best discriminate students who passed the licensure examination namely: HBSE, SWPP and SWM. The positive values clearly indicate that the higher the scores of the students in these three cluster subjects, the more they will likely to pass. It is not indicative also that the higher the GPA the more likely a student will pass the licensure examination. The discriminant model presented was generated to produce discriminating variables scores which identify students who passed and who failed.

REFERENCES

- Autida, R. (2010). Use of discriminant analysis in determining predictors of success on the chemist licensure examination. *Research Journal*. 29(2,) 1-14. Retrieved March 20, 2015 from ejournals.ph/index.php?journal=WMSURJ&page=article&op=viewpath%5B%5D=9038.
- Beeman, P. & Waterhouse, J. (2001). NCLEX-RN performance: Predicting success on the computerized examination. *Journal of Professional Nursing*, 17(4), 158-165
- Borek, L. (2006). Selected bachelor of science in nursing program variables impacting graduate scores on the national council licensure examination for registered nurses. A published dissertation. Liberty University. Retrieved May 23, 2015 from <http://digitalcommons.liberty.edu/doctoral/297/>
- Burds, K.J. (2010). A comparative analysis of demographic and academic characteristics. *Graduate Theses and Dissertations*. Paper 11639. Iowa State University. Retrieved May 23, 2015 from <http://lib.dr.iastate.edu/etd>.
- Daley, L., Kirpatrick, B., Frazier, S., Chung, M., Moser, D. (2003). Predictors of NCLEX-RN in a baccalaureate nursing program as a foundation for remediation. *Journal of Nursing Education*. 42(5), 1-10. Retrieved May 23, 2015 from www.ncbi.nlm.nih.gov/pubmed/13677554.
- Haas, R.E., Nugent, K.E., & Rule, R.A. (2004). The use of discriminant function analysis to predict student success on the NCLEX-RN. *Journal of Nursing Education*, 43(10), 440-446. Retrieved from <https://augusta.pure.elsevier.com/en/publications/the-use-of-discriminant-function-analysis-to-predict-student-succ>
- Hertz, N. & Chinn, R. (2015). Licensure examinations. Available at <https://www.clearhq.org/search/?q=hertz+and+chinn>
- Moss, S. (2016). *Cross validation in discriminant function analysis*. Retrieved from <http://www.sicotests.com/psyarticle.asp?id=157>
- Pachejo, S. & Allaga, W. (2013). Academic predictors of the licensure examination for Teacher's performance of the Rizal Technological University teacher education graduates. *International Journal of Educational Research and Technology*, 4(4), 31-39.

Tamayo, A.M., Bernardo, G. & Eguia, R. (2014). Readiness for the licensure examination of the civil engineering students University of Mindanao. *Advances in Educational Research*, 3(1), 001-006. Retrieved May 23, 2015 from www.scribescguildjournals.org/aer/Abstract/2014/Jan-Mar/AER13100%20Tamayo20et%20al.pdf.

Tamayo, A.M. (2015). Investigating the Results: A Criminologists Licensure Exam Study. Available at SSRN: <https://ssrn.com/abstract=2604903> or <http://dx.doi.org/10.2139/ssrn.2604903>

Uddin, N., Meah M., & Hossain, R. (2013). Discriminant analysis as an aid to human resource selection and human resource turnover minimization decisions. *International Journal of Business and Management*, 8(17), 153-169.

