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Intellective and Non-intellective Determinants of the Performance of the BSCE Graduates in the Licensure Examination

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ABSTRACT

This study focused on the analysis of the intellective and non-intellective determinants of the BSCE graduates' performance in the board examination. The descriptive-correlational method of research was utilized. The respondents were the 57 Bachelor of Science in Civil Engineering graduates who took the licensure examination in December, 2010. Frequency count and percentage was used to describe the intellective and non-intellective profile of the respondents and their performance in the licensure examination. Regression analysis was used to determine the relationship between the intellective and non-intellective factors and graduates' performance in the board examination.

Most of the respondents garnered high school general average of 85-89, with 80-84 college admission tests and a general average of 3.0 in the professional subjects. Majority of the respondents are 22 years old, male, graduated from public high school, have parents who are non-professionals and college graduates, live in urban areas and have family income that range from 10,001-15,000. Majority of the respondents got scores below 70 in the board examination. A significant relationship existed between the overall performance of the respondents in the board examination and the following: their performance in structural theory I and their type of residence.

The College of Engineering should immediately implement the new curriculum as contained in the CMO no. 12 s. 2009 to bridge the curriculum gap. A similar study should be conducted to explore more on the attributes that affect the performance of the UNP graduates in the board examination.

Keywords: intellective determinants, non-intellective determinants, BSCE graduates' performance, University of Northern Philippines

INTRODUCTION

Engineering is a branch of applied science that uses mathematics, science and technology to solve problems. Students in an engineering program are trained to understand the mechanics of buildings and other structures by applying the principles of science and mathematics. So when these students become full-fledged engineers, they will be able to design structures like bridges by applying their knowledge of

physics, mechanics and mathematics to create these structures that are safe for the public to use.

Having earned a diploma in Civil engineering courses does not qualify a graduate to use his engineering skills immediately. A graduate should first pass the licensure examination administered by the Professional Regulation Commission (PRC) in order to qualify to work as a professional civil engineer.

The Bachelor of Science in Civil Engineering course of the University of Northern Philippines was first offered in 1973. Since that time, UNP has produced many civil engineers who are successful in the field. However, studies conducted by Esguerra (1990), Quario (1990), Racho (1994) and de la Rosa (2010) showed that the performance of the BSCE graduates in the board examination has been low. Benchmarking on these studies, the researchers had decided to study the intellective and non-intellective determinants of the performance of the BSCE graduates in the licensure examination. It was the hope of the researchers, who are all teaching at the College of Engineering, to come out with information that could help alleviate the performance of their BSCE graduates in the board examination.

This study is a concerted effort to address the low passing percentage of the graduates of the College of Engineering, particularly the Civil Engineering program, on the low performance of the graduates in the licensure examination. It was conducted to determine the intellective and non-intellective determinants of the graduates' performance in the board examination. Specifically, it sought to determine the profile of the graduates categorized as Intellective determinants, which include the high school general average, UNP-CAT, and performance in the professional subjects and the non-intellective determinants, using the following: sex, age, type of high school graduated from, parents' occupation and educational attainment, type of residence and family income. This study also analysed the performance of the graduates in the board examination and tested the relationship between the intellective and non-intellective factors with the graduates' performance in the board examination.

The new global economy offers enormous opportunities for those graduates who have the knowledge and skills to take advantage of it. To ensure that all the graduates have the necessary knowledge to be successful in the workplace, these graduates should pass the board examination.

In the field of engineering, obtaining a professional engineering license is one of the most important milestones in an engineer's career. A professional engineering license allows an engineer to legally practice engineering work (Education Articles, 2014). Thus, passing the board examination for civil engineers is a very crucial step in building successful career.

Esguerra (1990:42) made a study on the "BSCE Graduates' Performance in the Board Examination as Related to Their Achievement in the Professional Subjects" and results of her study showed that the performance of the graduates in the board examination is below passing and suggested that the graduates were not fully prepared before they took the board examination. However, she pointed out that there existed a positive significant correlation between students' performance in the board examination and their achievement in their professional subjects (Hydraulics, Design and Construction).

Similarly, Racho (1994:49) in his study on the "Performance of the Non CSAT and CSAT BSCE Graduates in the Board Examination" revealed that the level of performance of the BSCE graduates (1979 -1985) of UNP graduates in the board examination was described as "failed". He also found out that the level of achievement in CE students' professional subjects was "fair". He suggested that there should be a minimum grade to maintain in order that the students taking the BSCE course should study hard to attain the required grade.

In the study conducted by Quario (1990:84), she found out that most of the examinee-respondents are three years older from the supposedly age of a BSCE student upon graduation which is twenty one. This denotes that these examinees did not take the board examination immediately upon graduation. She suggested that BSCE students should take the examination immediately upon graduation since it was found out that younger examinees are better achievers in the board examination than the older ones.

This study is similar to the above mentioned studies in the sense that it focused on the analysis of the board examination of the UNP graduates of BSCE; however, this study used both the intellective and non-intellective determinants of the graduates' performance in the board examination as the variables.

METHODOLOGY

This study employed the descriptive-correlational method of research. The intellective and non-intellective profile were correlated with the performance of the BSCE graduates in the licensure examination.

In this study, the researchers utilized the 57 Bachelor of Science in Civil Engineering graduates who took the licensure examination in December, 2010.
A questionnaire was used to solicit data regarding the intellective and non-intellective profile of the respondents. The performance of the respondents in the licensure

examination was taken from the Philippine Regulation Commission (PRC) print out which the researchers requested from the PRC.

The statistical tools used to analyse the data gathered in the study are the following: frequency count and percentage to describe the intellective and non-intellective profile of the respondents and their performance in the licensure examination. Regression analysis was used to determine the relationship between the intellective and non-intellective factors and graduates' performance in the board examination.

RESULTS AND DISCUSSION

Intellective Profile of the Graduates

The distribution of the graduates in terms of their general average in high school and their performance in the UNP college admission test (UNP CAT) is presented in table 1.

Table 1
Distribution of the Graduates in terms of High School General Average and UNP-CAT

High School General Average	f	%
90-above	2	3.51
85-89	30	52.63
80-84	24	42.10
75-79	1	1.75
Total	**57**	**100**
UNP College Admission Test		
85-89	21	36.84
80-84	22	38.60
75-79	14	24.56
Total	**57**	**100**

Majority of the respondents (30 or 52.63%) garnered high school general average of 85-89. A marked percentage of the respondents (22 or 38.60 %) got 80-84 in their college admission test while 21 (36.84%) obtained 85-89. This implies that majority of the respondents got scores in the UNP College Admission Test (UNP CAT) higher than the admission score requirement of the college which is only 75 percentile.

Table 2
Distribution of the Graduates in terms of their Performance in the Professional Subjects

Subject Grade	ST 1 Structural theory		CD Concrete design		CMT Construction materials and testing		TimD Timber design		ST2 Structural theory		SD Steel design		EqE Earthquake engineering	
	f	%	f	%	f	%	f	%	f	%	f	%	f	%
1.5	1	1.8	-	-	-	-	-	-	-	-	-	-	-	-
1.75	5	8.88	1	1.8	1	1.8	1	1.8	1	1.8	1	1.8	-	-
2.0	3	5.3	7	12.3	5	8.8	-	-	-	-	-	-	-	-
2.25	3	5.3	13	22.8	20	35.1	1	1.8	4	7	2	3.5	-	-
2.5	6	10.5	30	52.6	12	21.1	14	24.6	10	17.5	7	12.3	1	1.8
2.75	9	15.8	1	1.8	12	21.1	18	31.6	21	36.8	15	26.3	46	80.7
3.0	30	52.6	5	8.8	7	12.3	23	40.35	21	36.8	32	56	10	17.5
Total	57	100	57	100	57	100	57	100	57	100	57	100	57	100
Mean	**2.68**		**2.42**		**2.47**		**2.76**		**2.75**		**2.82**		**2.79**	

Table 2 shows that the respondents got a mean grade of 2.68 in structural theory I, 2.42 in concrete design, 2.47 in construction materials and testing, 2.76 in timber design, 2.75 in structural theory, 2.82 in steel design and 2.79 in earthquake engineering. The findings show that the respondents obtained fair rating in their board subjects. This may be an indication that the respondents may not have fully developed their skills in analysis thus they perform not so well in these subjects. In addition, most of the students just rely on their notes and do not bother to buy their own books which they can read if ever they do not understand the previous lecture.

Non-intellective Profile of the Graduates

The non-intellective profile of the respondents is shown in the table below.

Table 3
Distribution of Graduates in Terms of Their Non-intellective Profile

	Frequency (f)	Percentage (%)
Age		
24	1	3.44
23	8	13.79
22	33	56.9
21	15	25.86
Total	**57**	**100**
Sex		
Male	51	89.47
Female	6	10.53
Total	**57**	**100**
Type of High School Graduated From		
Public	50	87.72
Private	7	12.28
Total	**57**	**100**
Parents' Occupation		
Father		
Professional	23	40.35
Non-professional	34	59.65
Total	**57**	**100**
Mother		
Professional	17	29.82
Non-professional	40	70.18
Total	**57**	**100**
Parents' Educational Attainment		
Father		
Above college graduate	2	3.51
College graduate	26	45.61
College undergraduate	14	24.56
High school graduate	12	21.05
High school under graduate	2	3.51
Elementary graduate	1	1.75
Total	**57**	**100**
Mother		
Above college graduate	2	3.51
College graduate	23	40.35
College undergraduate	12	21.05
High school graduate	15	26.32
High school under graduate	3	5.26
Elementary graduate	2	3.51
Total	**57**	**100**

Place of residence		
Urban	35	61.40
`Rural	22	38.60
Total	**57**	**100**
Family income		
25,001-above	13	22.81
20,001-25,000	11	19.30
15,001-20,000	9	15.79
10,001-15,000	14	24.56
5,001-10,000	810	17.54
Total	**57**	**100**

The table shows that 33 or 56.9% of the respondents are 22 years old, 51 or 81.47% are male, 50 or 87.72% graduated from public high school, 34 or 59.65% have fathers who are working as non-professionals and 40 or 70.18% of them have mothers who are working as non-professionals. Furthermore 26 or 45.61% have fathers who are college graduates and 23 or 40.35% have mothers who are college graduates. On the other hand, 35 or 61.40% live in urban area and 14 or 24.56% came from family whose income range from 10001-15000.

The succeeding tables present the distribution of the different subject areas covered in BSCE graduates in terms of their performance in the licensure examination.

Table 4
Distribution of the Graduates in Terms of their Performance in Subject 1 (Mathematics and Surveying)

Score	F	%	Descriptive Rating
100	2	3.51	Excellent
90-99	9	15.79	Very Good
80-89	9	15.79	Good
70-79	15	26.31	Fair
Below 70	22	38.6	Failed
Total	**57**	**100**	

A great percentage of the respondents (22 or 38.6 %) got scores below 70 in subject l, which consists of mathematics and surveying. This finding may be attributed to a poor background in mathematics. However, it is worthy to note that two (3.51%) got perfect score in this area and nine (15.79 %) got scores that range from 90-99.

Table 5
Distribution of the Graduates in Terms of their Performance in Subject 2 (Hydraulics and Geotechnical Engineering)

Score	f	%	Descriptive Rating
100			
90-99	8	14.04	Very Good
80-89	15	26.32	Good
70-79	11	19.29	Fair
Below 70	23	40.35	Failed
Total	**57**	**100.00**	

It can be seen from the table that in subject 2 of the board examination (hydraulics and geotechnical engineering), 23 or 40.35% obtained a score below 70. During the time this research was being conducted, there was no laboratory equipment yet, hence the students might not have a full grasp of the concepts. However, there were eight (14.04 %) who obtained scores from 90-99.

The performance of the graduates in design and construction is shown in table 6.

Table 6
Distribution of the Graduates in terms of their Performance in Subject 3 (Design and Construction)

Score	f	%	Descriptive Rating
80-89	3	5.26	Good
70-79	8	14.04	Fair
Below 70	46	80.70	Failed
Total	**57**	**100**	

It can be seen in the table that design and construction is the waterloo of the respondents in as much as most of them got a score lower than 70 (46 or 80.70%) while only three (5.26%) got scores that range from 80-89. This is quite alarming because the low performance of the graduates in this area indicates low grasps of concepts along these areas which might have been attributed to poor exposure of the students to actual engineering field.

Table 7
Distribution of the Graduates in Terms of their Overall Performance

Score	f	%	Descriptive Rating
80-89	9	15.79	Good
70-79	11	19.3	Fair
Below 70	37	64.91	Failed
Total	**57**	**100**	

Table 7 shows the overall performance of the respondents in the board examination. It can be noted that majority of the respondents (37 or 64.91%) got below 70 score and only nine (15.79 %) got an average score of 80-89 in the board examination.

Determinants of BSCE Graduates' Performance In the Licensure Examination

The Performance of the BSCE graduates in the Licensure Examination was regressed to intellective and non-intellective factors. This was done to determine the factors that have significant contribution to the Students' performance in the said examination. The multiple Regression Analysis was therefore utilized for this purpose. The results of the analysis are shown in Table 8.

Table 8
Regression Analysis of BSCE Graduates' Performance in the Board Examination

Intellective & Non-Intellective Factors	Beta	t-value	Sig.
High school gen ave.	-.132	-.431	.669
UNP-CAT	-.266	-.668	.608
Structural theory I	-.563	-3.550	.001
Construction design	-.045	-.307	.750
Construction materials & testing	-.140	-.989	.329
Timber design	.185	1.155	.255
Structural theory II	.087	.531	.599
Steel design	-.315	-1.467	.151
Earthquake engineering	.034	.213	.832
Sex	-.084	-.590	.558
Age	.013	.048	.962
Type of high school grad from	-.304	-1.221	.230
Father's occupation	-.172	-.490	.627
Mother's occupation	-.323	-1.098	.279
Father's educational attainment	.005	.008	.993
Mother's educational attainment	.712	1.251	.219
Type of residence	-.687	-2.303	.027
Family income	.256	.497	.622

Mult R=0.786 F_{ratio} =3.418
R^2 = 0.618 $F_{prob=0.001}$

The table shows that the performance of the BSCE graduates in the board examination is significantly influenced by the combination of the intellective and non-intellective factors used in this study. The intellective and non-intellective variables considered in the study can account for 61.8% of the variance in the graduates' scores in the licensure examination. The remaining 38.2% of the variance could be due to other factors not considered in the study.

When the variables were taken singly, only the type of residence (t=-2.303) and the performance of the respondents in structural theory (t=3.550) proved to have significant influence on the performance of the graduates in the board examination (p<.05) This implies that, the type of residence and the performance of the graduates in structural theory directly affect their performance in the board examination.

The above findings imply that knowledge and skills in the structural theory have a significant contribution in the graduates' success in the licensure examination. The values of Beta suggest that the standardized score of the respondents in mathematics and surveying increases by .563 for every unit increase in their grades in Structural theory. Meanwhile, those who are residing in the rural areas tend to obtain higher mark in the licensure Examination than those who are staying in the urban areas.

Table 9
Regression Analysis of BSCE Graduates' Performance in Subject 1 (Mathematics and Surveying) of the Board Examination.

Intellective and Non-Intellective Factors	Beta	t-value	Sig.
High school gen ave.	0.082	.244	.808
UNP-CAT	-.026	-.060	.953
Structural theory	-.441	-2.600	.013
Construction design	-.218	-1.378	.176
Construction materials & testing	-.214	-1.388	.173
Timber design	.251	1.444	.157
Structural theory II	.186	1.038	.306
Steel design	-.258	-1.105	.276
Earthquake engineering	-.118	-.687	.496
Sex	-.030	-.194	.848
Age	-.172	-.594	.556
Type of high school grad from	-.062	-.229	.820
Father's occupation	.432	1.130	.266
Mother's occupation	-.103	-.321	.750
Father's educational attainment	.437	.697	.490
Mother's educational attainment	-.291	-.470	.641
Type of residence	-.334	-1.028	.311
Family income	-.473	-.845	.404
Mult R=0.746		F-ratio=2.557	
R^2=0.548		F_{prob}=0.007	

The table shows that the F_{prob} is less than 0.05 which indicates that the performance of the BSCE graduates in subject 1 (mathematics and surveying) is significantly influenced by the combination of the intellectual and non-intellectual factors. Taking the variables singly, only the performance of the graduates in structural theory I showed significant influence on their performance in subject 1.

As seen from the value of R^2 (0.548), the above stated variables can only explain 54.8% of the variance of the graduates' performance in subject 1 of the board examination. This means that the remaining 45.2% could be due to other variables not included in the study.

Table 10
Regression Analysis of BSCE Graduates' Performance in Subject 2 (Hydraulics and Geotechnical Engineering) of the Board Examination.

Intellective and Non-Intellective Factors	Beta	t-value	Sig.
High school gen ave.	-.289	-.846	.403
UNP-CAT	-.585	-1.318	.195
Structural theory	-.333	-1.917	.063
Construction design	.047	.288	.775
Construction materials & testing	-.106	-.670	.507
Timber design	.206	1.158	.254
Structural theory II	-.010	-.054	.957
Steel design	-.373	-1.558	.128
Earthquake engineering	.060	.340	.736
sex	-.075	-.472	.640
age	.090	.305	.762
Type of high school grad from	-.327	-1.180	.245
Father's occupation	-.522	-1.335	.190
Mother's occupation	-.376	-1.147	.258
Father's educational attainment	-.138	-.215	.831
Mother's educational attainment	1.010	1.593	.119
Type of residence	-.741	-2.230	.032
Family income	.956	1.668	.104

Mult R= 0.725 F-ratio= 2.342
R^2= 0.548 F_{prob}=0.014

As seen from Table 10, the F_{prob} is less than 0.05. This implies that the performance of the BSCE graduates in subject 2 (hydraulics and geotechnical engineering) is significantly influenced by the combination of the intellective and non-intellective factors considered in this study. Taking the variables singly, only the type of residence (p=0.032) significantly influenced the performance of the graduates in subject 2 of the board examination.

The R^2 value of 0.548 indicates that 54.80% of the above variables can explain the variance of the BSCE graduates performance in subject 2. The remaining 45.2% could be due to other variables not included in the study.

Table 11
Regression Analysis of BSCE Graduates' Performance in Subject 3 (Design and Construction Engineering) of the Board Examination.

Intellective and Non-Intellective Factors	Beta	t-value	Sig.
High school gen ave.	-.130	-.365	.717
UNP-CAT	-.063	-.137	.892
Structural theory I	-.618	-3.412	.002
Construction design	.071	.420	.677
Construction materials & testing	-.024	-.147	.884
Timber design	-.002	-.012	.991
Structural theory II	.039	.206	.838
Steel design	-.160	-.640	.526
Earthquake engineering	.150	.821	.417
sex	-.107	-.648	.521
age	.124	.401	.690
Type of high school grad from	-.389	-1.343	.187
Father's occupation	-.377	-.924	.362
Mother's occupation	-.341	-.997	.325
Father's educational attainment	-.308	-.460	.648
Mother's educational attainment	1.122	1.697	.098
Type of residence	-.667	-1.925	.062
Family income	.191	.319	.751

Mult R= 0.696 F-ratio=1.981
R^2=0.484 F_{prob}=0.038

It can be glimpsed from table 11 that the F_{prob} (0.038) is less than .05. This implies that the performance of the BSCE graduates in subject 3 (design and construction) is significantly influenced by the combination of the intellectual and non-intellectual factors. Taking the variables singly, only the performance of the graduates in structural theory I showed significant effect on their performance in subject 3. This implies that the performance of the graduates in the structural theory affect their performance in the area design and construction.

As seen from the value of R^2 (0.484), the above stated variables can only explain 48.4% of the variance of the graduates' performance in subject 3 of the board examination. This means that the remaining 51.6 % could be due to other variables not included in the study.

CONCLUSIONS

Majority of the respondents garnered high school general average of 85-89. A great percentage of the respondents got 80-84 and 85-89 in their college admission test. As to their performance in the professional subjects, majority of the respondents got a grade of 3.0 in structural theory I, timber design, and steel design, 2.75 in earthquake engineering, 2.5 in construction design and 2.25 in construction material

testing. Moreover, in structural theory II, a marked percentage got a grade of 2.75 and 3.0, respectively.

Majority of the respondents are 22 years old, male, graduated from public high school, have parents who are working as non-professionals and are college graduates, live in urban area and have family income that range from 10001-15000. Majority of the respondents got scores below 70 in the board examination.

The performance of the BSCE graduates in the board examination is significantly influenced by the combination of the intellective and non-intellective factors used in this study.

The type of residence and the performance of the graduates in structural theory showed significant effect in the overall performance of the graduates in the board examination. The performance in structural theory I of the graduates showed significant effect in their performance in subject 1 and subject 3 of the board examination; and only the type of residence significantly influenced their performance in subject 2.

RECOMMENDATIONS

The College of Engineering should immediately implement the new curriculum as contained in the CMO no. 12 s. 2009 to bridge the curriculum gap.

The faculty members handling professional subjects are encouraged to attend training programs, conferences, conventions and fora to keep abreast with the latest innovation in teaching methods for professional subjects.

Professional faculty members should shift from conventional questions (long worded problems with long solutions) to the multiple choice type of examination especially in the subject Structural Theory I to acquaint them on the way questions in the board examination are constructed(100 questions per subject).

A similar study should be conducted to explore more on the attributes that affect the performance of the UNP graduates in the board examination.

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