Predictors of Academic Performance for General Nursing Students: A Case of Health Assessment (Hea 231).

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ABSTRACT: *The aim of the study was to find factors that explain the differences in performance between the Institute of Health Sciences and predictors of performance for General Nursing year II students. The study adopted a quantitative cross sectional survey design to collect data from 152 students selected using stratified sampling with proportional allocation across five I.H.S's. Data collection was done using the Dundee Ready Education Environment Measure (DREEM) questionnaire and from official records. The research used correlation, Multivariate Analyses of Variance and Multiple Regression model to test the hypothesis. The results of the study show that there is no significant association between Admission Points and Performance in GN II, there is a significant difference in performance between institutions and academic performance can be predicted by some factors. The Learning and Opportunity to learn offered by the school DREEM subscales account for the differences in academic performance between institutions.*

KEYWORDS -*Admission points, Academic performance, Differences in performance, Predictors*

I.   Introduction

The world is experiencing a shortage of health care personnel. The 2010 Health Statistics report by Statistics Botswana indicates that the nurse-to-patient ratio is 353 per 100 000 people. This translates to a ratio of one nurse to 283 patients, hence indicating a severe shortage of nurses. To alleviate the shortage of nurses the government of Botswana trains nurses and allied health workers in various tertiary institutions across the country. Degree in nursing is trained by University of Botswana while those studying towards a diploma are trained in various Institute of Health Science's (I.H.S.) across Botswana. The Higher Diploma in General nursing is a three (3) year full-time program with a total of 110 credits spread over six semesters. A semester comprises sixteen (16) weeks of teaching, a week for registration, a week for mid-semester break, a week of revision before the examinations and a week for examinations making a total of twenty weeks. The entry requirements for admission are a minimum of Botswana General Certificate of Secondary Education (BGCSE) or its equivalent with a minimum of grade D in English Language and a minimum of grade C in Mathematics, Biology and Physics/Chemistry, Science Double award, The main goal of the program is to prepare a competent, accountable, effective, and innovative nursing practitioner who will provide quality nursing care in a variety of settings. A student is deemed to have passed a course within a program having obtained at least an average of 50% in each course within a semester and shall be awarded a higher Diploma in General nursing after successfully completing a minimum of 110 credits.

The study is set to find Predictors of Academic Performance for General Nursing year II Students in Institute of Health Sciences: A Case of Health Assessment (HEA 231). Cecile & Janssens (2018) defines a predictor as the act of forecasting what will happen in the future and Vargas (2013) defines academic performance as the quantitative result obtained during the learning process, based on the evaluations conducted by the teachers through objective test evaluations. Academic assessment and evaluation of student's performance is done every semester to ensure that students' progress to the next semester. Student assessment is divided into two distinct parts namely Continuous Assessment (CA) and End of Semester Examination. Courses like Health Assessment use only CA to award a student a final mark and some courses like Introduction to Psychology use both the CA and final examination to award a final mark. The weight of CA and Examination towards the final mark differs from one course to another but for most courses it is in the ratio of 50:50. The students must obtain a final mark of 50% or more for them to pass the course. The overall performance in a course is assessed on a percentage scale, then a letter grade and grade point are awarded.

Meyer and Van Niekerk (2008) emphasized that excellent performance forms the integral foundation of quality assurance and maintenance of ambitious standards in the workplace hence students who excel in academic studies are more likely to excel in the work environment. Different researchers have identified varying factors that affect student academic performance as follows; Ali et al. 2013 identified the following factors: gender, school education, residential area students come from, medium of instruction in schools, tuition trends, daily study hours, accommodation and the socio-economic background of the parents or guardians. Meadus and Twomey (2007) identified Age, gender, and ethnicity as significant indicators of academic performance among nursing students. Sansgiry (2004) identified academic competencies, test competencies, time management and study strategies as the main factors that affect academic performance.

The purpose of the study is to investigate factors that explain differences in performance between schools and predictors of academic performance of second year general Nursing students**.** The study adopts an input process output model, this model implies a theory of change. The theory of change in the study is that inputs which in this model refer to the caliber of students and the social context combined with processes that aid learning will account for gains in student learning. In this study the inputs are the admission marks (converted into points) while the process variables are course content, Course content or learning, teaching, opportunities to learn offered by school, student social welfare and opportunities to learn from the students' effort. The main output is student gains.Currently in Botswana (and worldwide) there is a shortage of qualified nurses in the health care workforce, therefore the government has built Institute of Health Sciences to train nurses who will upon completion address the shortage of health care workforce. What has been observed are the differences in performance between nursing institutions? Hass, Nugent, and Rule (2004) stated that there is a need to have a mechanism that can predict academic success for nursing students during their studies. The research problem of the study is that a significant percentage of students continue to perform below expectation even though they had met the minimum entry requirements and that differences in performance also vary by school.

The main objective of the study is to find out factors that explain the differences in performance between schools and predictors of students' performance of general nursing year II students. In this way, educational resources can be honed to best meet the needs of the students and the profession/workforce to ensure success the findings from this study will be beneficial to the students, lecturer's policy makers and public as the study will provide some valuable evaluation information on the current General Nursing program. Lecturers and management of I.H.Ses will use the results of the study to find ways of improving the learning environment of students which may lead to improvement in students' academic performance. The research questions of the study are: Is there any association between entry qualification (admission points) and academic performance of GN II students? What factors account for the differences in performance between institutions? What are the predictors of academic performance of GN II students

II.   Methodology

The research participants were registered General Nursing year II students across the five-government owned Institute of Health Science's campuses namely Francistown, Gaborone, Lobatse, Molepolole and Serowe. The total population for participants was 210 students but data was collected from 137 student's selected using stratified random sampling with proportional allocation. Permission to conduct the survey was issued by Office of Research and Development UB, Research Unit Ministry of Tertiary Education and Principals of the five IHSes. A Class list was requested from each institution and the researcher used simple random sampling to select the sample size for each institution.The researcher visited the respondents at the residence hall and issued them with questionnaire's which they consented to respond to.

Data on admission points (commonly referred to as IHS Points) was obtained from the Academic Registrar's office. The students were ranked according to points obtained in two science subjects Mathematics and English. The IHS admission points are calculated from four subjects, two science subjects, mathematics and English hence the maximum points one can obtain is 36 points.The researcher adopted the Dundee Ready Education Environment Measure (DREEM). The DREEM was published in 1997 as a tool to evaluate educational environments of medical schools and other health training settings. The DREEM is divided into 5 main subscales namely: Students' perception of learning which has 12 items; Students' perceptions of teachers (11 items); Students' academic self-perceptions (8 items); Students' perceptions of atmosphere (12 items) and Students' social self-perceptions (7 items). Each of the 50 statements is scored on a five-point scale, with the following labels: ''strongly agree'' (4), ''Agree'' (3), ''Unsure'' (2), ''Disagree'' (1) and ''strongly disagree'' (0). Students' Academic Performance will be collected from the published pink book of results which in this case is the percentage mark obtained for Health Assessment (HEA 231) course.

Data on admission points and student academic performance was collected from the Academic Registers records being the admission file and published results. The grades obtained at BGCSE are converted into points i.e. $A^* = 9$ points, A= 8, B=7, C=6 and D = 5 points. The IHS admission points are calculated using four subjects, two science subjects, mathematics and English hence the maximum points one can obtain is 36 points. The academic results will be percentage marks obtained for Health Assessment. The students were issued with the DREEM tool questionnaire which is a self-administered questionnaire to respond to. The questionnaire was self-administered and lasted for 45 minutes. The data was collected between June and August 2020.

The participants were all General Nursing year II students all residing on –campus at the respective institution, with an average age of 21 years and majority being females. All the respondents were Christians and 99% of them were single.

The research was set to test the following hypothesis: There is no significant association between entry qualification (admission points) and academic performance of GN II students, there are no factors that account for the differences in performance between institutions and there are no factors that predict academic performance of GN II students. The following statistical measures were used to test the hypothesis: Correlation to test if there is no significant association between entry qualification (admission points) and academic performance of GN II students, Multivariate Analysis of Variance will be used to if there are no factors that account for the differences in performance between institutions and Multiple Linear Regression will be used to test if there are no factors that predict academic performance of GN II students.

III. Results

The study aims to find out factors that explain the differences in performance between Institute of Health Sciences and predictors of students' performance for General Nursing year II students. The study was set to test the following hypothesis: There is no significant association between entry qualification (admission points) and academic performance of GN II students, there are no factors that account for the differences in performance between institutions and there are no factors that predict academic performance of GN II students.

Data was collected from 152 General Nursing year II students in five Institute of Health Sciences across Botswana. Table 7 below shows that the mean age of respondents was 21.97 with a standard deviation of 2.676. Most of the respondents were females and their previous school was a public school. Most of the respondents were students from t I.H.S Francistown and Serowe (25percent each) while Lobatse contributed only 14.5% of the respondents. The first research question wasto determine if there is any association between entry qualification (admission/I.H.S points) and academic performance of GN II students. In answering the research question the following hypothesis were formulated.

H_0: There is no significant association between entry qualification (admission/I.H.S points) and academic performance of GN II students.

H_1: There is a significant association between entry qualification (admission/I.H.S points) and academic performance of GN II students.

Correlation was used to test for association between admission /I.H.S Points and academic performance of GN II students.

Table 1: Overall Correlations

		Admission points	Mark HEA 231
Admission points	Pearson Correlation	1	-.171[*]
	Sig. (2-tailed)		.035
	N	152	152
Mark HEA 231	Pearson Correlation	-.171[*]	1
	Sig. (2-tailed)	.035	
	N	152	152

"There is a weak negative relationship between Admission points and HEA Mark."
Pearson's *r* (152) = -.171, *p*< .035". The correlation coefficient is -.171 which shows a weak negative association between admission points and HEA 231 mark. The correlation coefficient of -.171 signifies that a one unit increase in the number of points obtained will lead to a .171 unit decrease in HEA 231 marks. The researcher also tested if there is any association between entry qualification (admission/I.H.S points) and academic performance of GN II students per institution and the institutional correlations are shown in table below.

Table 2: Institutional Correlations

Institution	Number of students (N)	Sig (2 tailed)	Correlation Coefficient
Gaborone	26	.91	-.023
Francistown	38	.223	-.203
Lobatse	22	.325	-.22
Molepolole	28	.172	-.265
Serowe	38	.647	.077

The institutional correlations show a weak negative correlation for four institutions, namely I.H.S Gaborone, Francistown, Lobatse and Molepolole while a positive weak correlation is recorded at I.H.S Serowe.

The second research question wasto determine what factors account for the differences in performance between institutions and a Multivariate Analysis of Variance was used to test the null hypothesis? In answering the research question the following hypothesis were formulated.

H_0: There are no factors that account for the differences in performance between institutions.

H_1: There are factors that account for the differences in performance between institutions.

Table 3: Descriptive Statistics from MANOVA

Sub-scale	Name of Institution	Mean	Std Dev	Sub-scale	Name of Institution	Mean	Std Dev
Learning	Gaborone	3.061	.507	**Teaching**	Gaborone	2.563	.545
	Francistown	2.943	.372		Francistown	2.519	.309
	Lobatse	2.890	.349		Lobatse	2.318	.335/
	Molepolole	2.642	.480		Molepolole	2.216	.517
	Serowe	2.716	.493		Serowe	2.386	.440
Student Effort	Gaborone	3.212	.570	**Opportunity from school**	Gaborone	2.731	.688
	Francistown	3.076	.535		Francistown	2.680	.422
	Lobatse	3.028	.552		Lobatse	2.474	.738
	Molepolole	2.727	.686		Molepolole	2.148	.554
	Serowe	2.865	.609		Serowe	2.203	.621
Social Welfare	Gaborone	2.209	.770	**Marks HEA 231**	Gaborone	65.985	6.245
	Francistown	2.008	.484		Francistown	71.887	5.395
	Lobatse	2.175	.633		Lobatse	66.959	4.683
	Molepolole	2.032	.447		Molepolole	65.596	6.956
	Serowe	2.243	.531		Serowe	73.197	6.570

Thedescriptive statistics table above shows that I.H.S Serowe has the highest average mark of 73.197 with a standard deviation of 6.570 while I.H.S Molepolole had the lowest average mark of 65.596percent with a standard deviation of 6.956. The descriptive table further shows the average mark for each sub-scale per institution. I.H.S Serowe had the highest average mark (M) of 2.243 with a standard deviation (S.D) of .531 for the student Social Welfare subscale while I.H.S Francistown recorded the lowest average score of 2.008 with a S.D of .484. IHS Gaborone recorded the highest average score of 3.212 with S.D of .570 under the sub-scale opportunity from student effort while I.H.S Serowe recorded the lowest average of 2.865 with a S.D of .609. I.H.S. Gaborone recorded the highest average scores in the Learning, Teaching and Opportunity to learn offered by school sub-scales. The average scores are 3.061 with S.D .507, 2.563 with S.D .545 and 2.731 with S.D .688, respectively. I.H.S. Molepolole recorded the lowest average scores in the Learning, Teaching and Opportunity to learn offered by school sub-scales. The average scores are 2.642 with S.D .480, 2.216 with S.D .517 and 2.148 with S.D .554, respectively.Table 4 below shows results of a multivariate test which tests if there are differences between institutional means. The researcher opted to use the Wilks' Lambda statistic to test whether there are no differences in group means of each institution.

Table 4: Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
IHS	Pillai's Trace	.535	3.679	24.000	572.000	.000	.134
	Wilks' Lambda	.544	3.886	24.000	489.612	.000	.141
	Hotelling's Trace	.697	4.025	24.000	554.000	.000	.148
	Roy's Largest Root	.381	9.075[c]	6.000	143.000	.000	.276

There was a statistically significant difference in academic performance based on institution that one attends, Wilk's Λ = .544, F (24, 489) = 3.886, P= .000 partial η^2=.141This signifies that academic performance of students is dependent on which I.H.S one attends.Between subject tests show that HEA 231 Marks (P-value= .000) and the Learning (P-value= .003), Teaching (P-value= .019), Opportunity to learn from student effort (P-value= .025) and Opportunity to learn from school (P-value= .000) sub-scales are all significant as they have p-values which are less than .05. The student social welfare (P-value= .331) is the only sub-scale which is not significant as its p-value is greater than .05. The results signify that there are significant differences in HEA 231 Marks, Learning, Teaching, Opportunity to learn from student effort and Opportunity to learn from school between institutions but there are no significant differences in student social welfare between institutions. Table 5 below show the between subject's effects result.

Table 5: Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
IHS	Learning	3.348	4	.837	4.205	.003	.104
	Teaching	2.290	4	.572	3.046	.019	.078
	Student effort	4.013	4	1.003	2.871	.025	.073
	Opportunity from school	8.788	4	2.197	6.159	.000	.145

Student social welfare	1.512	4	.378	1.160	.331	.031
Mark HEA 231	1592.837	4	398.209	10.845	.000	.230

MANOVA output produced a multiple comparisons table denoted as table 18. The multiple comparison tests whether there is a significant difference in mean scores of a subscale between two institutions. The results from the multiple comparison table show the Learning subscale is statistically significantly different between I.H.S Gaborone and I.H.S Molepolole (p-value = .023) which is less than .05. The leaning subscale is not significant between any other two institutions. The teaching, student social welfare and opportunity from student effort comparisons between two institutions are all not statistically significant as the p-values are greater than .05. The opportunity to learn from school subscale shows that there is a statistical significant difference between I.H.S Gaborone and I.H.S Molepolole (p-value = .016), I.H.S Gaborone and I.H.S Serowe (p-value = .021), I.H.S Francistown and I.H.S Molepolole (p-value = .017) and I.H.S Francistown and I.H.S Serowe (p-value = .021). The multiple comparison tests were used to test if there is a significant difference in mean scores for HEA 231 between institutions. The results show that there is a statistically significant difference between I.H.S Gaborone and I.H.S Francistown (p-value = .007), between I.H.S Gaborone and I.H.S Francistown (p-value = .0000), between I.H.S Francistown and I.H.S Molepolole (p-value = .003), between I.H.S Lobatse and I.H.S Serowe (p-value =.007) and between I.H.S Molepolole and I.H.S Serowe (p-value =.000). Table 6 overleaf shows the multiple comparison tables.

Table 6: Multiple Comparisons

Dependent Variable	Variable (I)	Variable (J)	Sig	Dependent Variable	Variable (I)	Variable (J)	Sig
Learning	Gaborone	Francistown	0.897	Student Effort	Gaborone	Francistown	0.936
		Lobatse	0.782			Lobatse	0.887
		Molepolole	0.023			Molepolole	0.069
		Serowe	0.064			Serowe	0.268
	Francistown	Lobatse	0.995		Francistown	Lobatse	0.999
		Molepolole	0.133			Molepolole	0.246
		Serowe	0.309			Serowe	0.666
	Lobatse	Molepolole	0.444		Lobatse	Molepolole	0.534
		Serowe	0.718			Serowe	0.901
	Molepolole	Serowe	0.98		Molepolole	Serowe	0.931
Teaching	Gaborone	Francistown	0.997	Opportunity from School	Gaborone	Francistown	0.998
		Lobatse	0.437			Lobatse	0.697
		Molepolole	0.08			Molepolole	0.016
		Serowe	0.636			Serowe	0.021

Mark 231	HEA	Francistown	Lobatse	0.56	Student social welfare	Francistown	Lobatse	0.797
			Molepolole	0.107			Molepolole	0.017
			Serowe	0.777			Serowe	0.021
		Lobatse	Molepolole	0.953		Lobatse	Molepolole	0.466
			Serowe	0.987			Serowe	0.587
		Molepolole	Serowe	0.662		Molepolole	Serowe	0.998
		Gaborone	Francistown	0.007		Gaborone	Francistown	0.75
			Lobatse	0.989			Lobatse	1
			Molepolole	1			Molepolole	0.865
			Serowe	0			Serowe	1
		Francistown	Lobatse	0.061		Francistown	Lobatse	0.877
			Molepolole	0.003			Molepolole	1
			Serowe	0.927			Serowe	0.527
		Lobatse	Molepolole	0.961		Lobatse	Molepolole	0.942
			Serowe	0.007			Serowe	0.995
		Molepolole	Serowe	0		Molepolole	Serowe	0.71

Using evidence from MANOVA output tables, the null hypothesis was rejected as there was evidence to suggest that there are some factors that are significantly different hence influencing students' performance.

The third research question was to determine the predictors of academic performance of GN II students. In answering the research question the following hypothesis were formulated.

H_0: There are no factors that predict academic performance of GN II students.

H_1: There are factors that predict academic performance of GN II students.

The regression output tables are presented overleaf.

Table 1: Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.268[a]	.072	.034	6.7249

The R- value can be a measure of the quality of the prediction of the dependent variable. An R-value greater than .7 indicates a satisfactory level of prediction. The R^2 value indicates how much of the total variation in the dependent variable can be explained by the independent variables. The R^2 value of .072 indicates that 7.2 percent of the HEA 231 Mark is explained by the model.

Table 2: *ANOVA*

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	508.841	6	84.807	1.875	.089[b]
	Residual	6557.568	145	45.225		
	Total	7066.409	151			

The ANOVA table indicates whether the regression model predicts the dependent variable significantly well. The regression significance level is .089 which is greater than .05 hence this indicates that overall, the regression model does not significantly predict the Marks obtained.

Table 3: Co efficient of the Regression Model

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	86.021	8.787		9.790	.000		
	Admission points	-.661	.302	-.176	-2.187	.030	.985	1.016
	learning	3.241	1.672	.222	1.939	.054	.488	2.048
	Teaching	-.487	1.300	-.034	-.374	.709	.788	1.269
	Student effort	.227	1.189	.021	.191	.849	.553	1.808
	Opportunity from school	-1.173	1.314	-.111	-.893	.373	.411	2.435
	Student social welfare	-1.994	1.041	-.174	-1.915	.057	.771	1.296

Using table 9 above the researcher produced the following regression model for predicting academic performance.

$$Y = -.176X_1 + .222X_2 - .034X_3 + .021X_4 - .111X_5 - .174X_6 \qquad \text{Standardized coefficients}$$

Where   Y = HEA 231 Mark

X_1 = Admission points

X_2 = Learning

X_3 = Teaching

X_4 = Student effort

X_5 = Opportunity from school

X_6 = Student social welfare

The overall decision that the researcher concluded was that admission points only predict 1.7percent of the GPA that one will obtain upon completion of the Higher National Diploma in General Nursing. Since admission points contribute only 1.7 percent towards the GPA obtained and 98.3percent is predicted by other variables the researcher concludes that admission points do not predict GPA obtained.

The research was conducted in five Institute of Health sciences across Botswana with a sample size of 152 General Nursing Year II (GN II) students forty-eight being males and 104 being females and the average

age of the students was 22 years. Most of the students attended a public school at BGCSE. The research was undertaken to test three hypotheses namely: There is no significant association between admission/I.H.S points and academic performance of GN II students, there are no factors that account for the differences in performance between institutions andthere are no factors that predict academic performance of GN II students. The researcher rejected the first hypothesis that stated that there is no significant association between admission /I.H.S Points and Performance in GN II. The second hypothesis was rejected as there was evidence from MANOVA outputs that there is a significant difference in performance between institutions and that Learning and Opportunity to learn offered by the school are the two main factors that are significantly different between institutions hence leading to differing performance between institutions. The third hypothesis was also rejected as there was evidence from the regression model that academic performance can be predicted by some factors.

IV. Discussion

The aim of the study was to find out factors that explain the differences in performance between schools and predictors of student's performance of general nursing year II students.Evidence from research findings is that there is a week negative association between admission/I.H.S points and academic performance of GN II students. Oducado and Penuela (2014) conducted a study titled Predictors of Academic Performance in Professional Nursing Courses in Philippines and found that there is an association between admission points and academic performance of Bachelor of Nursing Students. Similar results were found by Mthimunye, Daniels and Pedro (2018) when conducting a study on second year Bachelor of Nursing Students at a university in the Western Cape. Agbo (2003) conducted a study on different science subjects at university level and identified a low correlation between entry qualifications and students' performance. The results from the study mean that getting higher admission Points in BGCSE does not lead to one getting higher marks in the General Nursing Program hence those students with low admission points can be given proper guidance and support to help them improve and perform better than those with high admission grades.The results of the study also show that there are differences in performance between institutions and that learning and opportunity to learn offered by the school are the main factors that account for the differences in performance between institutions. Shrestha et al. (2019) and Mthimunye and Daniels (2019) found that an opportunity to learn offered by the school affects academic performance of students. Ayodele and Adebiyi (2013) found that learning habits adopted by students affect their academic performance. The results show that although institutions are offering the same program they differ in terms of their resources and infrastructure which leads to students' performance differing. Notable differences in resources were hostel residence, kitchen, library, and internet connectivity. The learning subscale results show that the methods of learning differ per institution which might also be attributed to the resources within the institution. The institutions that performed better also had a higher learning and opportunity to learnoffered by the school. The results for the third hypothesis show academic performance of GN II students can be predicted using the regression model: HEA 231 Mark $=- .176X_1 + .222X_2 - .034X_3 + .021X_4 - .111X_5 - .174X_6$

V. Limitations

The main limitation of the study was that data was collected from students only and not from lecturers. Evidence from the results show that the following subscales: Learning Opportunity to learn from student effort and Student Social Welfare which were targeting students were highly rated while the following subscales: Opportunity to learn from school and Teaching were lowly rated.

VI. Conclusion

Evidence from the research results show that there is a weak negative association between admission/I.H.S points and academic performance of GN II students, there are differences in performance between institutions and that learning and opportunity to learn offered by the school are the main factors that account for the differences in performance between institutions and that one can predict academic performance

of GN II students using the following regression model: HEA 231 Mark $= -.176X_1 + .222X_2 - .034X_3 + .021X_4 - .111X_5 - .174X_6$

Recommendations

The results of the study show that learning and opportunity to learn offered by the school are the main factors that account for the differences in performance therefore the government should strive to distribute resources (internet, accommodation and meals) equally between institutions so as to level the ground to enable students in different institutions an equal opportunity to succeed in the studies. Further research should be undertaken to investigate the causes of the negative association between admission points and academic performance.

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