

ON EXAMINATION MALPRACTICE IN NIGERIA UNIVERSITIES: FACTOR ANALYSIS DEFINITION

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Abstract. Examination malpractice has become an epidemic in the nation's educational system. This study seeks to assess the pattern of examination malpractice in higher institutions in Nigeria, their causes, effects and also proffer solutions. The sample size of the study was calculated using Yaro Yamane formula. The instrument used for the study was a questionnaire titled "Causes and Effects of Examination Malpractice" (CEEMQ). The data collected were analyzed using Factor analysis and Principal component analysis. The findings from the factor analysis in factor loading 1 revealed that items 13 (0.5998), 29 (0.6785) and item 8 (0.5062) are the major causes of examination malpractice. Factor loading 2 revealed that item 26 (0.6594) and item 25 (0.6342) are the major solutions and effects of exam malpractice. Analysis from factor loading 8 revealed that factor 15 (0.5154) is also a major cause of exam malpractice.

Keywords: factor analysis, principal component, malpractice, examination

Introduction

In Nigeria, the educational system and other systems are in crisis-ridden. Some recent researches have shown that the majority of students who gained admissions in tertiary institutions in Nigeria are products of examination malpractice (Emaikwu & Eba, 2007). Maduemezia (1998) reported that the first examination malpractice in Nigeria occurred in 1914 during the Senior Cambridge Local Examination papers which were leaked before the scheduled date of examination.

The National Universities Commission (NUC) rose up to tackle this menace, which has eaten up the education system of the country by declaring War Against Sorting (WAS) in Nigeria Universities. As the body identified sorting, which could be in the form of money, gift items or sex as the canker-worm eating up the quality of the education system. Thus, the commission has directed all universities to mount aggressive awareness campaign against exam malpractice and its consequence on campuses and also to set up committee with the sole objective of eradicating academic vices in their university.¹⁾

The purpose of this research work is to assess the pattern of examination malpractice in MAUTECH, their causes, effects and suggest possible solutions. Thus, the objectives of this study are to identify the more prominent forms of examination malpractice in MAUTECH, and determine the number of factors that would be sufficient to explain the pattern of variability in examination malpractice in the school

Literature review

Examination malpractice is defined as a deliberate wrong doing contrary to official examination rules designed to place a candidate at an unfair advantage or disadvantage (Wilayat, 2009). Fasasi (2006) posited that examination malpractice may be understood as “a misconduct or improper practice, before, during or after any examination by examinees or others with a view to

obtaining good results by fraudulent means". From these definitions, it can be concluded that examination malpractice is an unethical act because it encourages mediocrity in that students who succeed through such unorthodox methods may be rated equal to those who struggle on their own to excel.

In schools, students who engage in examination malpractice manifest the possession of certain knowledge by illicit means (Cizek, 1999). Pavela (1997) argues that examination malpractice includes the unauthorized use of materials and/or information by a student. It is important, therefore, to discuss examination malpractice in order to create awareness among both students and authorities concerned, and, to suggest proper measures for controlling such deviant activities of examinees during examination period.

Research shows that there are personal, institutional, and social reasons why students engage in examination malpractice (Brimble & Stevenson-Clarke, 2005; Covington, 1998; Barnett & Dalton, 1981; Schab, 1969). Students engage in examination malpractice because they want to pass (Cizek, 1999).

Causes of examination malpractice

Students' reasons for examination malpractice are: inadequate concern to students welfare promote examination malpractice (Brimble Stevenson-Clarke., 2005), parental factor, peer attitude (Woolfolk, 2004; Wentzel, 1997; Bandura, 1997; Michaels & Miethe, 1989). McCabe (1993) argued that "peers' behaviour had, by far, the strongest influence on academic dishonesty". Some students who belong to clubs, fraternities and other groups learn the strategies, motivations, values, beliefs, rationalizations and behaviour of their peers (Anderman & Murdock, 2007). Students model peer behaviour under some social conditions: *gender factor* - some studies maintain that male students engage in examination malpractice more than female students (Hughes & McCabe, 2006; McCabe & Trevino, 1997). The study of Calabrese &

Cochran (1990) have shown that girls are as likely to engage in examination malpractice as boys when the intention is to help a friend.

Other factors that prompt examination malpractice include, among others: societal value system (too much emphasis on paper qualification), psychological factor, economic factors, poor and inadequate teaching/learning environment or facilities etc.

Former President Obasanjo said of the perpetrator of examination malpractice:

[t]hey see education as a means of meal ticket, getting a job and so must acquire the paper qualification by hook or crook. We must change that perception or orientation so that they will appreciate the intrinsic value of education which is the total development of the individual to be able to make meaningful contribution to the family, community and nation.²⁾

Methodology

In this study, the sample is made up of undergraduate students in the School of Pure and Applied Sciences of Moddibo Adama University of Technology, Yola. The instrument adopted for this study is a structured questionnaire, with a four-point's likert rating scale of strongly agree, agree, disagree and strongly disagree

A sample of 154 respondents was drawn using the Yaro Yamane simplified formula. The Yaro Yamane formula is given by:

$$n = \frac{N}{1 + N(e)^2} \quad (1)$$

where n is the sample size, N is the population size and e is the level of precision.

Factor analysis

Factor analysis attempts to identify variables, or factors, that explain the pattern of correlations within a set of observed variables. Factor analysis is often used in data reduction to identify a small number of factors that explain most of the variance observed in a much larger number of manifest variables. Factor analysis can also be used to generate hypotheses regarding causal mechanisms or to screen variables for subsequent analysis (for example, to identify collinearity prior to performing a linear regression analysis). Factor analysis procedure offers a high degree of flexibility.

Multiple factor is based on the premise that a large number of questionnaire items could be reduced to only a few dimensions. The multiple factor approach emphasized the goal of extracting a maximum amount of variance from a correlation. Consider the general factor model.

$$X_{p \times 1} = \mu_{p \times 1} + L_{p \times m} f_{m \times 1} + \varepsilon_{p \times 1} \quad (2)$$

The regression coefficient l (the partial slopes) for all of those multiple regressions are called i^{th} variable and the j^{th} factor which could be collected in the matrix as shown below.

$$L = \begin{pmatrix} l_{11} & \cdots & l_{1m} \\ \vdots & \ddots & \vdots \\ l_{p1} & \cdots & l_{pm} \end{pmatrix} \quad (3)$$

Orthogonal factor model

The aim of factor analysis is to explain the outcome of p variables in the data matrix χ using fewer variables, *the so-called factors*. Ideally all the information in χ can be reproduced by a smaller number of factors. These factors are interpreted as latent (unobserved) common characteristics of the observed $\chi \in \mathfrak{R}^p$. The case just described occurs whenever y observed $\chi = (\chi_1, \dots, \chi_p)^T$ can be written as

$$\chi_j = \sum_{\ell=1}^k q_j f_\ell + \mu_j \quad j = 1, \dots, p \quad (4)$$

Here, f_ℓ , for $\ell = 1, \dots, k$ denote the factors. The number of factors k , should always be much smaller than p .

We can create a representation of the observations that is similar to the one in Eq (5) by means of principal components, but only if the last $p - k$ eigenvalues corresponding to the covariance matrix are equal to zero. Consider a p -dimensional random vector with mean and covariance matrix $Var(X) = \Sigma$. A model similar to Eq (4) can be written for in matrix notation,

$$X = QF + \mu \quad (5)$$

where F is the k -dimensional vector of the k factors.

The spectral decomposition of Σ is given by $\Gamma \Lambda \Gamma^T$. Suppose that only the first k eigenvalues are positive, i.e. $\lambda_{k+1} = \dots = \lambda_p = 0$. then the (singular) covariance matrix can be written as

$$\Sigma = \sum_{\ell=1}^k \lambda_\ell \gamma_\ell \gamma_\ell^T = (\Gamma_1 \Gamma_2) \begin{pmatrix} \Lambda_1 & 0 \\ 0 & 0 \end{pmatrix} \begin{pmatrix} \Gamma_1^T \\ \Gamma_2^T \end{pmatrix} \quad (6)$$

Note that the covariance matrix of equation (5) can be written as

$$\Sigma = E(X - \mu)(X - \mu)^T = QE(FF^T)Q^T = QQ^T = \sum \lambda_j \gamma_j \gamma_j^T \quad (7)$$

It is common praxis in factor analysis to split the influences of the factors into common and specific ones. There are, for example, highly informative factors that are common to all of the components X of and factors that are specific to certain components. The factor analysis model used in praxis is a generalization of Eq. (6):

$$X = QF + U + \mu \quad (8)$$

Estimating factor scores

Factor Scores (also called component scores in Principal Component Analysis), are the scores are the scores of each case (row) on each factor (column). To compute the factor score for a given case of a given factor, one takes the case's standardized score on each variable, multiplies by the corresponding factor loading of the variable for the given factor, and sums these products. Therefore, given the factor model

$$Y_i = \mu + Lf_i + \varepsilon_i, \quad \forall i \quad (9)$$

There are many methods for computing factor scores $f = (f_1, f_2, \dots, f_m)$. For this study, we used the method of Ordinary Least Squares. We have

$$\sum_{i=1}^p \varepsilon_{ij}^2 = \sum_{i=1}^p (y_i - \mu - lf_i)^2 = (y_i - \mu - lf_i)(y_i - \mu - lf_i)^T \quad (10)$$

This takes the form of a least square regressions, only that we have known our L , but wish to estimate the

$$\hat{f}_i = (LL)^{-1}L(y_i - \mu) \quad (11)$$

Using the Principal Component method with the un-rotated factor loadings, this yields

$$\hat{f}_i = \begin{pmatrix} \frac{1}{\sqrt{\hat{\lambda}_1}} \hat{e}_1(Y_1 - \bar{y}) \\ \frac{1}{\sqrt{\hat{\lambda}_2}} \hat{e}_2(Y_2 - \bar{y}) \\ \vdots \\ \frac{1}{\sqrt{\hat{\lambda}_m}} \hat{e}_m(Y_m - \bar{y}) \end{pmatrix} \quad (12)$$

Bartlett's test

Bartlett's test is used to test the homogeneity of variance in the factors. Bartlett's test (Snedecor & Cochran, 1989) is used to test if k group have equal variances. Equal variances across groups or samples are called homogeneity of variance. Bartlett's test is sensitive to departures from normality. That is, if your groups/samples come from non-normal distributions. Then Bartlett's test may be testing for non-normality. The Bartlett's test of hypothesis is given as:

$$H_0 : \delta_1 = \delta_2 = \dots = \delta_k$$

$$H_1 : \delta_i \neq \delta_j \text{ for at least one pair}(i, j)$$

Test statistics

$$T = \frac{(N - k)InS_p^2 - \sum_{i=1}^k (N_i - 1)InS_i^2}{1 + \left(\frac{1}{3(k-1)}\right) \left(\left(\sum_{i=1}^k \frac{1}{(N_i - 1)InS_i^2} \right) - \frac{1}{(N - k)} \right)} \quad (13)$$

In the above, S_i^2 is the variance of the i^{th} group, N is the total sample size, N_i is the sample size of the i^{th} group, k is the number of groups, and S_p^2 is the pooled variance.

Data analysis

Analysis was carried out using STATA Version 12 software.

Table 1. Bartlett's Test

Bartlett's Test of Sphericity	Approx. Chi-Square	1270.081
	Df	496
	Sig.	.000

Table 1 shows the result of Bartlett's test. The Bartlett's test requires measuring the Homogeneity of variance across variables. From the table, we reject Ho and conclude that the variances across the variables are not equal. In this regard, this calls for the use of Factor Analysis, to see the variable that poses high variability contribution to the set of data.

Table 2. Total variance explained by each component

Principal components/correlation	
Number of obs	= 154
Rotation: (unrotated = principal)	
Number of comp	= 32
Trace	= 32
Retained Factors	= 11

Rho = 1.00

Component	Eigen value	Difference	Proportion	Cumulative
1	5.35235	2.50512	0.1673	0.1673
2	2.84723	1.09262	0.0890	0.2562
3	1.75461	.146926	0.0548	0.3111
4	1.60768	.122103	0.0502	0.3613
5	1.48558	.0312018	0.0464	0.4077
6	1.45438	.110273	0.0454	0.4532
7	1.3441	.0759944	0.0420	0.4952
8	1.26811	.0650311	0.0396	0.5348
9	1.20308	.057902	0.0376	0.5724
10	1.14518	.108014	0.0358	0.6082
11	1.03716	.0661357	0.0324	0.6406
12	.971027	.0318286	0.0303	0.6710
13	.939198	.120179	0.0293	0.7003
14	.819019	.0190261	0.0256	0.7259
15	.799993	.0554405	0.0250	0.7509
16	.744552	.0452316	0.0233	0.7742
17	.699321	.0259603	0.0219	0.7960
18	.673361	.012745	0.0210	0.8171
19	.660616	.0512999	0.0206	0.8377
20	.609316	.0275142	0.0190	0.8567
21	.581801	.0503295	0.0182	0.8749
22	.531472	.0617507	0.0166	0.8915
23	.469721	.0082701	0.0147	0.9062
24	.461451	.0286281	0.0144	0.9206
25	.432823	.0308118	0.0135	0.9342
26	.402011	.0335231	0.0126	0.9467
27	.368488	.0322615	0.0115	0.9582
28	.336227	.0303646	0.0105	0.9687
29	.305862	.0393498	0.0096	0.9783
30	.266512	.0173775	0.0083	0.9866
31	.249135	.0704967	0.0078	0.9944
32	.178638		0.0056	1.0000

Table 2 shows the eigenvalues in column two, in line with Kaiser (1974) suggestion, only the factors with eigenvalues greater than unity were retained. This implies that only the first eleven factors in the table were retained. These factors accounted for over 64% of the total variance of the eleven variables. With thirty two (32), the total standardized variance is 32. Of this, we see that components 1 explain 5.35235, which amount to

5.35235/32=0.1673 or about 17% of the total. Component 2 explains 2.84723/32=0.0890 or an additional 9% etc.

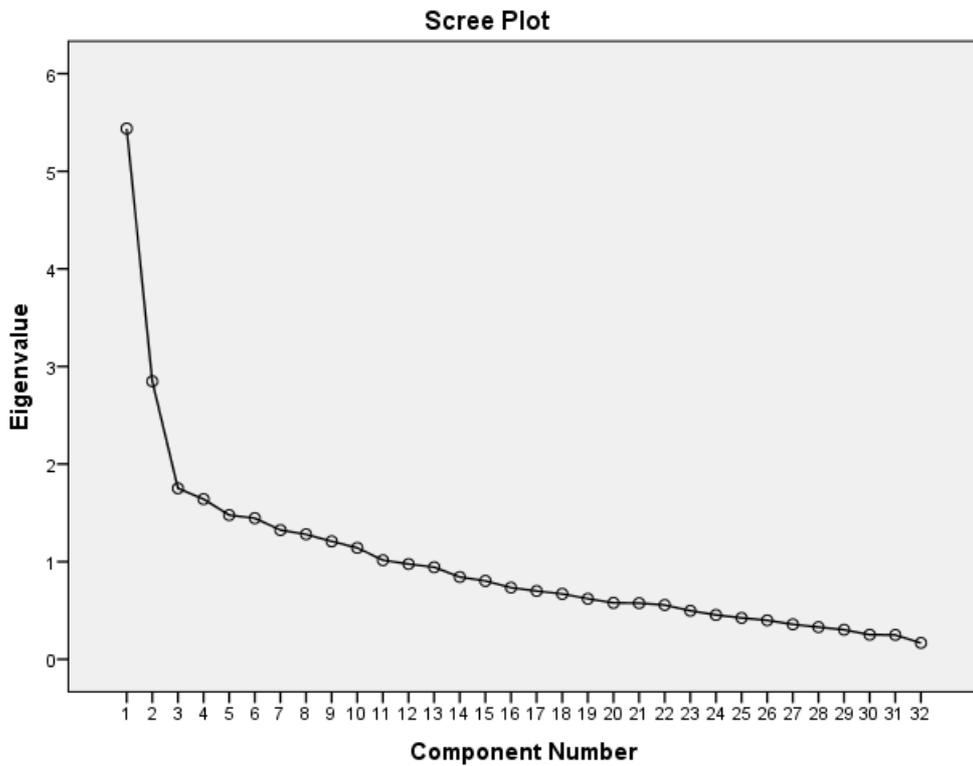


Table 3. Communalities extracted by each variable

Variables	Initial	Extraction
1	1.000	.695
2	1.000	.622
3	1.000	.684
4	1.000	.579
5	1.000	.633
6	1.000	.581
7	1.000	.579
8	1.000	.602
9	1.000	.596
10	1.000	.668
11	1.000	.639
12	1.000	.618
13	1.000	.569
14	1.000	.605
15	1.000	.724
16	1.000	.549

17	1.000	.694
18	1.000	.720
19	1.000	.594
20	1.000	.683
21	1.000	.700
22	1.000	.684
23	1.000	.558
24	1.000	.595
25	1.000	.715
26	1.000	.764
27	1.000	.658
28	1.000	.667
29	1.000	.666
30	1.000	.669
31	1.000	.626
32	1.000	.631

Table 3 shows the communalities which measures the percentage of variance explained by all the components. That is, the communality is the squared multiple comparison for the variable using the components as predictors. Communalities for a variable is the sum of squared components loadings for that variable (row) and is the percent of variance due to the variable explained by all the components.

For full orthogonal factor analysis, the communality will be 1.0 and all the variance in the variable will be explained by all the factors, with their number equals that of the variables and is written under initial. The extracted communalities, is the percent of variance in a given variable explained by the factors that are extracted, which are normally fewer in number that the original variables which lead the coefficient to be less than 1.0.

Table 4. Factor analysis/correlation (rotation oblique promax) `

Factor	Variance	Proportion
Factor1	3.86309	0.1207
Factor2	3.42858	0.1071
Factor 3	2.85749	0.0893
Factor 4	2.64704	0.0827
Factor 5	2.27176	0.0710

Factor 6	2.09816	0.0656
Factor 7	1.73450	0.0542
Factor 8	1.65270	0.0516
Factor 9	1.65134	0.0516
Factor 10	1.51364	0.0473
Factor 11	1.36056	0.0425

LR test: independent vs saturated: chi-square (496) =1312.48
 Prob>chi2=0.0000

Ho: Number of factors is not sufficient vs

H₁: Number of factors retained is sufficient

From the likelihood ratio test, the p-value (0.000) is less than 0.05, thus, we reject Ho and conclude that the number of factor retained is sufficient.

Table 5. Factor loading showing correlation between factors and each variables factors

S/N	ITEM	Factors											Uniqueness
		1	2	3	4	5	6	7	8	9	10	11	
1	Provided the examination is difficult; are you interested in cheating	0.5245	0.0332	0.1050	-0.4975	0.0980	-0.0906	0.1383	-0.2803	0.2046	-0.1061	-0.1856	0.2622
2	Do you prefer cheating since most people who cheat often pass their examinations without repeating or even being punished	0.4569	-0.2496	0.3177	-0.0164	0.1530	-0.1802	0.0669	-0.2161	-0.0820	-0.3340	-0.2315	0.3487
3	No matter how much you read, you don't pass examination as expected	0.2179	0.0342	0.2202	0.3642	-0.4309	-0.3118	0.0155	0.1297	-0.4204	-0.0370	-0.0892	0.2841
4	Does lack of necessary confidence in yourself makes you to cheat	0.3133	0.1327	-0.3859	0.2273	0.1783	-0.2395	0.2077	0.2719	0.0412	0.1213	0.3309	0.3515
5	Do you cheat because your colleagues cheat in examinations	0.5807	-0.1185	0.0716	0.0022	0.4020	-0.1743	0.1087	0.1680	-0.1406	-0.0586	0.0565	0.3849
6	Do your parents support the idea of engaging in exams malpractice	0.3778	0.2170	0.2580	0.2857	0.1664	0.0330	0.1517	0.4062	0.1370	0.0762	0.2715	0.3469
7	Do you cheat in examinations because passing will please both parents and friends	0.5062	-0.0363	-0.0131	0.0121	0.1792	-0.1374	0.2954	-0.2298	-0.2185	0.0411	0.4013	0.3406
8	Most parents encourage their children to cheat in examinations	0.2411	-0.2021	0.4470	-0.0556	0.0873	-0.2563	-0.2009	0.1724	-0.0320	0.3223	0.0173	0.4495
9	Does the Nigeria system of education seems to encourage cheating in examinations	0.4774	0.0504	0.1096	0.0631	0.2140	0.0435	-0.2149	0.2423	0.0231	0.4197	0.0316	0.4234
10	Cheating is very common in Nigeria institutions of higher learning	0.3405	0.4197	-0.1251	0.2047	0.1800	0.2314	-0.0224	-0.1611	0.2813	-0.3460	-0.1882	0.3037
11	Do you consider only those who cheat have high grades in examinations	0.3918	-0.2076	0.1251	0.2176	0.0978	-0.1727	0.0964	0.2445	0.2960	-0.4283	-0.0270	0.3602
12	Do you recommend cheating for difficult examinations	0.5944	-0.0377	0.1426	-0.0263	0.1395	-0.1435	0.0451	0.0248	0.3544	0.2052	-0.1314	0.3966
13	Do you consider those who cheat in the same examination as having an advantage over me	0.5998	0.0455	-0.1792	0.0440	-0.1864	-0.0862	0.0485	0.0439	0.1860	0.2008	-0.1945	0.4449
14	Do you see cheating as the only way out of a lot of work done over a long period of time	0.5423	-0.1889	0.2511	0.2508	-0.0472	0.1103	0.2614	-0.0109	0.1576	0.0289	-0.1162	0.4222
15	Is cheating helpful for people who are very nervous about examinations	0.2983	0.0738	0.0576	-0.1412	-0.2864	0.4354	0.1287	0.5154	0.0167	0.0955	-0.2881	0.2361
16	It is good to arrange to sit next to someone in order to copy from his/her paper	0.5912	-0.0727	0.0616	0.0877	-0.2987	-0.0751	-0.1150	0.0574	-0.0149	-0.1166	0.1200	0.4941
17	I can take examinations for another person	0.1930	0.1585	0.3700	0.2749	0.0252	0.4515	-0.3420	0.0982	0.1245	0.0815	0.3335	0.2607
18	If the question paper is availed to me before the examination, I will definitely pass	0.3516	0.3244	-0.2887	0.1345	-0.4242	-0.0385	-0.0283	0.1098	0.1645	-0.0818	0.0617	0.4379

19	If I am offered to buy the examination question paper ahead of the examination, I will definitely be interested	0.5877	0.2285	-	-	-	0.0004	0.1045	-	0.1106	0.0138	0.1641	0.3982
20	Some lecturers/ teachers encourage cheating in examinations	0.3541	0.3558	-	0.0627	0.4254	0.1453	-	-	-	0.1525	-	0.3373
21	A few lecturers/ teachers help their students to pass examinations	0.2267	0.5229	-	0.2026	0.2204	0.0758	-	0.2151	-	-	-	0.3053
22	It is in fact difficult to eradicate cheating in examinations in the Nigeria institutions of learning	0.4681	0.2610	-	0.4246	-	-	-	0.1243	0.1114	-	0.0908	0.3176
23	Students should never write examinations without the presence of supervisors or invigilators	0.0377	0.3880	0.1905	-	-	-	-	0.1156	-	-	-	0.46554
24	Smuggling unauthorized materials in an examination hall is a common way of cheating in examinations	0.0309	0.5707	0.2195	-	-	-	-	-	-	0.0870	0.0340	0.4686
25	Cheating in examinations is a proof of moral decadence of a society that leads to corruption	0.0160	0.6342	0.4508	-	-	0.0134	-	0.0231	0.0102	0.1625	0.0876	0.3061
26	Any cheating in examinations is a fraudulent act that should be severely punished	0.2876	0.6594	0.2872	-	-	0.1240	0.1435	0.1150	0.1363	0.0543	0.0378	0.2872
27	I am interested in cheating in University examinations because I do not have sufficient time to prepare for the examination	0.5308	-	0.0504	-	0.1067	0.3989	0.1354	0.0217	0.3952	0.0321	-	0.3304
28	Cheating in examination makes me feel pretty guilty	0.0265	0.2874	0.0170	0.2339	0.2260	0.2410	0.4836	0.3302	-	0.0506	0.1185	0.3911
29	I may not feel guilty to cheat if the lecturer/teacher does not teach properly	0.6785	0.1134	-	0.2319	0.0191	0.0659	0.1363	0.1641	0.1980	0.0144	-	0.3150
30	Cheating is not necessary if a candidate has adequately prepared before the examinations	-	0.2800	0.2317	0.4226	-	-	0.2106	-	0.3046	0.4185	-	0.3124
31	Buying certificates is alright, provided one is not caught	0.4880	-	0.0810	-	0.2854	0.4215	-	-	0.0866	0.1138	0.2072	0.3647
32	Buying certificate is another form of cheating in examination	-	0.4673	0.3395	0.1553	0.1784	0.0305	0.3235	-	-	-	0.2283	0.3528

Table 5. is used to interpret factor loading in factor analysis. We want to have some criterion, which helps us to determine which of these are large and which of these are considered to be negligible.

(1) In factor 1, identifies items 1, 5, 7, 12, 13, 14, 27 and 29 as the factor that prompt examination malpractice while items 16, 19, and 21 as the forms of malpractice prevalence in the institution. The amount of explained variability or contribution each item are as shown in Table 5.

(2) In factor 2, identifies items 21 and 24 as forms of malpractice, items 25 and 26 as effect of malpractice. The amount of explained variability or contribution each item are as shown in Table 5;

(3) In Factor 8, item 15 is identifies as a factor that prompt examination malpractice.

Conclusion

From the analysis, the following forms of examination malpractice were identified: collaboration, purchase of question paper before exam, lecturer/teacher aid and smuggling unauthorized materials into the examination hall while the factors that prompt students to engage in exam malpractice include difficult questions, peer influence, parental effect, harsh exam condition, unequal student treatment, excess course load, fear of failing, inadequate preparation and lecturer/teacher inefficiency. the result shows that examination malpractice result in moral decadence in a society resulting in high scale corruption and fraudulent acts which are punishable by law. Authorities are thus encouraged to step up the fight against examination malpractice in our higher institution of learning.

NOTES

1. <http://www.atbu.edu.ng/app/assets/files/NUC%20Position%20Paper%20on%20Grade%20sorting%20in%20Nig.pdf>
2. <http://www.nairaland.com/4745/hnd-graduates-now-rise-above#156848>

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