TO STUDY ASPECTS OF DEGRADATION IN EDUCATIONAL PERFORMANCE OF UG STUDENTS BASED ON STATISTICAL TOOLS AND TECHNIQUES

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ABSTRACT

Identifying the factors that influence academic performance is an essential part of educational research. Here, we study the academic performance among a selected group of 349 undergraduate students from different colleges in Kolhapur district. Our work is based on primary data collected using well-designed questionnaires containing various attributes. Different statistical tools and techniques are used for analysis of different aspects of degradation in students' educational performance. Our study shows that teacher performance is excellent and all students are satisfied with the quality of teaching.

KEYWORDS: Graphical Representation, Z-Test, Chi-square Test, ANOVA, Level of significance.
INTRODUCTION
Since research on academic achievement began to emerge as a field in the 1960s, it has guided educational policies on admissions and dropout prevention (Kassarnig et al., 2018). Although more discussion made in the literature has focused on higher education, the knowledge obtained on behavioral phenomena observed in colleges and universities can potentially guide research on student behavior in primary and secondary schools and A number of behavioral patterns have been linked to academic performance, such as time allocation (Macan TH et al., 1990), active social ties (Gašević D et al., 2006), or participation in sport activity (Singh et al., 2012). Most of the existing studies, however, suffer from biases and limitations often associated with surveys and self-reports (Van de Mortel TF et al., 2008) and Junco R (2013), particularly when measuring social networks (Kumbasar et al., 1994; O'Connor KM, 1992). Today we are living in the 21st century. We know that recently the competition is increased in every field of life. Therefore the students should get the ability to compete with the world. We know that every year 6.8 crores students complete their graduation in India. But how many of them are getting a good settled life is a more important question.

Here we introduced the student’s marks with their standards like 10th, 12th, F.Y, S.Y, T.Y in Science faculty. We can check how their study is related to their marks and how do the students get continued their performance from 10th to second year. All these things of consistency in their marks should benefit to get the job. So this project gives an idea to us about the marks study combination of students.

In this article we studied the comparative academic results of third year students in different colleges. It is a view that how the students’ results are correlated with their sex, facilities, teacher performance, annual income, use of social media. If we overlook all these we know that third year is most important year. So in this article the marks of third year students and how their educational graph is changed from 10th standard to third year is increased or decreased or remains constant. So we have introduced a performance detected by the students or how it is correlated with their previous marks. That is why our study is very helpful to conclude that how their marks are continued with the standard.

In different colleges 349 students of third year are studied, in which we take 349 students to study their results. We have collected their data by taking questionnaire.

OBJECTIVES
1. To study consistency in marks of college students

METHODOLOGY
For collection of data we use questionnaire and the questionnaire includes the information about their address, use of phone, marks, parent occupation and annual income, family, use of social media, future planning, college facilities, and also their view about teachers’ performance. We collect information of 349 students from T.Y. B.Sc. in different colleges- 69 students from D.M. Bidri, 59 students from S.M.M. Murgud, 135 students from Vivekanand College, 31 students from the New College and 55 students from R.C. Shahu College, Kolhapur.

Data Collection
For the study we have collected primary data from Science students in following colleges by using questionnaires method. D.M. Bidri, S.M.M. Murgud, Vivekanand College, The New College and R.C. Shahu College, Kolhapur.

Statistical tools used
- Graphical representation
- Theory of attribute
- Testing of hypothesis

Software used
- Minitab
- MS-Excel
**GRAPHICAL REPRESENTATION**

### Teacher performance

- **Excellent**: 62%
- **Very Good**: 23%
- **Good**: 12%
- **Satisfactory**: 3%

### Study Time

- **Only Before Exam**: 22%
- **Weekly**: 14%
- **80%**: 50%
- **Only**: 58%

### Genderwise Distribution of Mobile Types

- **Percentage of Students**
  - **Simple**: 19%
  - **Android**: 29%
  - **Mobile Type**: 48%
  - **No Use**: 23%

### Facilities in College

- **Library**: 91%
- **Study centre**: 59%
- **Canteen**: 72%
- **Carrier**: 63%
- **Events**: 74%
- **National games**: 34%

### Distribution of use of social media

- **Social Networking sites**
  - **Facebook**: 52%
  - **Google+**: 56%
  - **Twitter**: 38%
  - **Hatpad**: 31%
  - **WhatsApp**: 17%
  - **Others**: 7%

### Simple Bar Digram of Students Family Annual Income

- **Annual Income of Family In Thousand**
  - **Below 30**: 14%
  - **30-50**: 12%
  - **50-70**: 16%
  - **70-90**: 8%
  - **90-150**: 4%
  - **Above 150**: 4%
**TESTING OF HYPOTHESIS**

**a) The study of association and colligation between employment and gender**

Let the attribute A denote gender and B denote Employment.

\( (AB) = \text{Employed males} = 379; \quad (A\beta) = \text{Unemployed males} = 479 \)

\( (\alpha B) = \text{Employed females} = 133; \quad (\alpha\beta) = \text{Unemployed females} = 644 \)

<table>
<thead>
<tr>
<th>Coefficient of association</th>
<th>Coefficient of colligation</th>
</tr>
</thead>
<tbody>
<tr>
<td>( Q = \frac{(AB)(\alpha\beta) - (A\beta)(\alpha B)}{(AB)(\alpha\beta) + (A\beta)(\alpha B)} )</td>
<td>( Y = \sqrt{\frac{(AB)(\alpha\beta) - (A\beta)(\alpha B)}{(AB)(\alpha B) + (A\beta)(\alpha B)}} )</td>
</tr>
<tr>
<td>( Q = 0.586026 )</td>
<td>( Y = 0.765523 )</td>
</tr>
</tbody>
</table>

**b) The study of association and colligation between literacy and gender**

Let the attribute A denote gender and B denote Literacy

\( (AB) = \text{Literate males} = 663; \quad (A\beta) = \text{Illiterate males} = 57 \)

\( (\alpha B) = \text{Literate females} = 688; \quad (\alpha\beta) = \text{Illiterate females} = 101 \)

<table>
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<tr>
<td>( Q = \frac{(AB)(\alpha\beta) - (A\beta)(\alpha B)}{(AB)(\alpha\beta) + (A\beta)(\alpha B)} )</td>
<td>( Y = \sqrt{\frac{(AB)(\alpha\beta) - (A\beta)(\alpha B)}{(AB)(\alpha B) + (A\beta)(\alpha B)}} )</td>
</tr>
<tr>
<td>( Q = 0.2613 )</td>
<td>( Y = 0.5111 )</td>
</tr>
</tbody>
</table>

**c) Chi-square test for independence of employment and Gender.**

Let the attribute A denote gender and B denote Employment and the hypothesis are:

\( H_0: \) The gender and employment are independent V/S

\( H_1: \) The gender and employment are not independent

\( \alpha = \text{Level of significance} = 5\% \)

\( (a) = \text{No. of employed males} = 379; (b) = \text{No. of unemployed males} = 479 \)

\( (c) = \text{No. of employed females} = 133; (d) = \text{No. of unemployed females} = 644 \)
N = Population size = 1635

**Test Statistic:**
\[ \chi^2 = \frac{N \times (ad-bc)^2}{(a+b)(c+d)(a+c)(b+d)} \]
\[ \chi^2 = 138.7661 \]
Critical value = \( \chi^2_{\text{table}} = \chi^2_{1,0.05} = 3.841 \)

**d) Chi-square test for independence of Literacy and Gender.**
Let the attribute A denote gender and B denote Literacy and the hypothesis are:
- \( H_0 \): The gender and Literate are independent V/S
- \( H_1 \): The gender and Literate are not independent
\( \alpha \) = Level of significance = 5%
(a) = No. of Literate males = 663; (b) = No. of Illiterate males = 57
(c) = No. of Literate females = 688; (d) = No. of Illiterate females = 101
N = Population size = 1509

**Test Statistic:**
\[ \chi^2 = \frac{N \times (ad-bc)^2}{(a+b)(c+d)(a+c)(b+d)} \]
\[ \chi^2 = 9.5807 \]
Critical value = \( \chi^2_{\text{table}} = \chi^2_{1,0.05} = 3.841 \)

**e) Test for proportion of users of mobile phone among Male in Rural and Urban Areas:**
Let us denote first population is student in rural area and second population is student in urban area.
- \( P_1 \) = Proportion of male mobile user in rural area.
- \( P_2 \) = Proportion of male mobile users in urban area.
- \( n_1 \) = Sample size of student in rural = 101
- \( n_2 \) = Sample size of student in urban = 44
\( p_1 \) = Sample proportion of male users of mobile phone in Rural = 0.8118
\( p_2 \) = Sample proportion of male users of mobile phone in Urban = 0.9779

**Hypothesis:**
- \( H_0 \): \( P_1 = P_2 \)
- \( H_1 \): \( P_1 \neq P_2 \)

\[ \bar{p} = \frac{n_1 p_1 + n_2 p_2}{n_1 + n_2} \]
\[ \bar{p} = 0.8620 \quad \text{and} \quad \bar{q} = 0.1379 \]
The test statistic is,
\[ Z_{\text{cal}} = \frac{p_1 - p_2}{\sqrt{\bar{p} \cdot \bar{q} \cdot (\frac{1}{n_1} + \frac{1}{n_2})}} \]
\[ Z_{\text{cal}} = -2.6558 \]
Table value of Z is, \( Z_{\alpha/2} = 1.96 \)

**f) Test for proportion of users of mobile phone among Female (Rural and Urban)**
Population 1: students in rural area and Population 2: student in urban area.
- \( P_1 \) = Proportion of female users of mobile phone in rural area.
- \( P_2 \) = Proportion of female users of mobile phone in urban area.
- \( n_1 \) = Sample size of student in rural = 147 and \( n_2 \) = Sample size of student in urban = 57
Sample proportion of female users of mobile phone in Rural = 0.6870
Sample proportion of female users of mobile phone in Urban = 0.9298

**Hypothesis:** H₀: P₁=P₂ against H₁: P₁≠P₂

**Calculation:**

\[
\hat{\theta} = \frac{(n_1p_1 + n_2p_2)}{(n_1+n_2)} = 0.7549
\]
\[
\text{and } \hat{q} = 0.2450 \quad \text{Under } H_0
\]

The test statistic is,
\[
Z_{cal} = \frac{p_1-p_2}{\sqrt{\hat{\theta}\hat{q}\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}} = -7.5986
\]

Therefore table value of Z is, \(Z = 1.96\)

**g) Test for proportion of genderwise users of mobile in Urban:**

Population 1 = Male student’s in urban area.
Population 2 = Female student’s in urban area.
Sample size of male = n₁ = 145 and Sample size of female = n₂ = 204
p₁: Sample proportion of male users of mobile phone in urban = 0.2965
p₂: Sample proportion of female users of mobile phone in urban = 0.2598
Let the level of significance \(\alpha = 5\%\)

**Hypothesis:** H₀: P₁=P₂ against H₁: P₁≠P₂

**Calculation:**

\[
\hat{\theta} = \frac{(n_1p_1 + n_2p_2)}{(n_1+n_2)} = 0.7549
\]
\[
\text{and } \hat{q} = 0.2450 \quad \text{Under } H_0
\]

The test statistic is,
\[
Z_{cal} = \frac{p_1-p_2}{\sqrt{\hat{\theta}\hat{q}\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}} = -7.5986
\]

Under H₀.Critical value or table value of Z is, \(Z = 1.96\)

**h) Test for proportion of users of mobile in Rural (Male and Female)**

Population 1: Male students in rural area.
Population 2: Female students in rural area.
Sample size of male = n₁ = 145
Sample size of female = n₂ = 204
p₁: Sample proportion of male users of mobile phone in rural = 0.5655
p₂: Sample proportion of female users of mobile phone in rural = 0.4950
Let the level of significance \(\alpha = 5\%\)

**Hypothesis:** H₀: P₁=P₂ against H₁: P₁≠P₂

**Calculation:**

\[
\hat{\theta} = \frac{(n_1p_1 + n_2p_2)}{(n_1+n_2)} = 0.7549
\]
\[
\text{and } \hat{q} = 0.2450 \quad \text{Under } H_0
\]

The test statistic is,
\[
Z_{cal} = \frac{p_1-p_2}{\sqrt{\hat{\theta}\hat{q}\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}} = 0.7567
\]

Under H₀.Critical value or table value of Z is, \(Z = 1.96\)
Calculation

\[ \hat{\rho} = \frac{(n_1p_1 + n_2p_2)}{(n_1 + n_2)} \]

\[ \hat{\rho} = 0.5242 \quad \text{and} \quad \hat{q} = 0.4757 \]

Under H₀ the test statistic is,

\[ Z_{\text{cal}} = \frac{\hat{p}^1 - \hat{p}^2}{\sqrt{\hat{p} \hat{q} \left( \frac{1}{n_1} + \frac{1}{n_2} \right)}} = 1.2997 \]

Critical value or table value of Z is, \( Z_{\alpha/2} = 1.96 \)

i) Test for equality of regression coefficient.

\[ y = \text{second year marks}; x_1 = \text{first year marks}; x_2 = \text{HSC marks}; x_3 = \text{SSC marks}; \]

The multiple regression equation is,

\[ y = 4.576133 + 0.775995x_1 + 0.088656x_2 + 0.0810196x_3 \]

ANOVA TABLE:

<table>
<thead>
<tr>
<th></th>
<th>d.f.</th>
<th>s. s.</th>
<th>m. s.</th>
<th>F</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>3</td>
<td>4779.343</td>
<td>1593.114</td>
<td>38.15648</td>
<td>0.00145</td>
</tr>
<tr>
<td>Residual</td>
<td>56</td>
<td>2338.119</td>
<td>41.75213</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>59</td>
<td>7117.462</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis:

\( H_0: \beta_2 = 0 \quad \text{and} \quad \beta_3 = 0 \quad \text{and} \quad \beta_4 = 0. \)

\( H_1: \) At least one of the \( \beta_2, \beta_3, \) and \( \beta_4 \) does not equal to zero.

Level of significance \( \alpha = 5\% \)

\[ P-Value = 0.00145 \]

\[ P-Value < 0.05, \]

Test for Multiple Regression

<table>
<thead>
<tr>
<th></th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple R</td>
<td>0.819448</td>
</tr>
<tr>
<td>R-square</td>
<td>0.671495</td>
</tr>
<tr>
<td>Adj. R square</td>
<td>0.653897</td>
</tr>
<tr>
<td>Std. Error</td>
<td>6.461589</td>
</tr>
<tr>
<td>Observations</td>
<td>60</td>
</tr>
</tbody>
</table>
OVERALL CONCLUSION

Our study shows that sixty two percent students are say that teacher performance is excellent and nearly all students are satisfy with quality of teaching. Sixty four percent students daily do study work regularly. The Percentage of using mobile phone in male students is higher than female students as well as nearly eighty percent male students are use android mobile. Ninety one percent facility in colleges. Many students use whatsapp and facebook but rare students are known about goolg+. There are many students having family annual income above one lakh. Consistency in marks of students in vivekanand college is good as compared with other colleges and there is positive association between employment and gender, employment and gender, literacy and gender and gender and employment are not independent. Literacy is dependent on gender as well as the proportion of male users of mobile phone in rural is not equal to the proportion of male users of mobile phone in urban. But there is equal proportion of female which are uses mobile phone in rural and urban area. And the proportion of male users of mobile phone in urban is equal to proportion of female users of mobile phone in urban. The regression coefficients are significant. 67.14 percent of the variation of second year marks around its mean is explained by the repressors first year marks, H.S.C marks and S.S.C marks.

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