An Anaylsis of Assessment Bias Influenced by Presentation and Writing Technique in Undergraduate Engineering Examination

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***Abstract*—The IT industry has seen stupendous growth during the last decade. The demand for engineering professionals is ever increasing such that there is always dearth for the right people in this field. Today, many top corporate houses are giving a lot of importance to Campus recruitment. Each company has its own eligibility criteria. In addition an eligibility criterion to appear for campus placement is based on the aggregate marks of 6 semesters of Under Graduate university exam. All universities across India have 100 marks full mark theory paper for almost all engineering courses. Unfortunately, most of undergraduates' students are obtaining less mark in their University Examination resulting in lower aggregate percentage. The objective of this experiment is to demonstrate that there exist an assessment bias in engineering university exam assessment process influenced by presentation and writing technique. The results showed that marks secured by students in university examination are influenced by presentation format and writing technique for almost same content when assessed by different evaluator. Training the students to develop an effective presentation and handwriting technique will enable them to produce a legible and fluent personal style enhancing grades in University exams.**

Keywords*— *Assessment bias ; evaluation ; effective presentation; writing

I. INTRODUCTION

In India, there are several engineering colleges imparting undergraduate and graduate courses in engineering, applied engineering and sciences. The demand for these engineering professionals is ever increasing such that there is always dearth for the right people in this field. All the engineering institutes/colleges across India have four academic years (=8 Semesters), with the year being comprised of two Semesters of ~ 20 weeks (>=90 working days) each for course work, followed by In Semester Evaluation (ISE) & End Semester Evaluation (ESE). Marks obtained by students in university exams permit faculty, recruiters to make inferences about the theoretical knowledge students possess. The process of making exam–oriented inferences about students, in fact, represents the bedrock of educational assessment. Unfortunately, most of undergraduates' students are obtaining lesser marks in their End Semester Examination resulting in lower aggregate percentage. There are two dimensions to this problem of engineering students obtaining low grades:

i. University Assessment process.
ii. Students theory paper presentation and writing technique

However the problem with assessment of engineering papers in all universities and undergraduate students obtaining less mark in University Examination is known but this problem is neither addresses by the respective universities nor engineering undergraduates students. The objective of this experiment is two-fold:

1) To demonstrate that assessment bias in engineering university exam assessment process is influenced by presentation and writing technique

2) To exhibit that prescribed effective theory paper presentation and writing technique enhances evaluation marks. To support the further research we conducted a 3 day workshop on prescribed effective presentation and writing technique. The basic idea was to train the students to develop an effective presentation and handwriting technique that will enable them to produce a legible and fluent personal style enhancing grades in theory exams.

The participants of this study were 60 students from second year engineering students. A two-group posttest-only randomized experiment was used for our study. The experimental group had 30 students that were trained in prescribed effective presentation and handwriting technique through the 3 day workshop whereas the control group had 30 students that did not undergo any prescribed presentation and writing workshop. The results showed higher performance on the post test scores of the experiment group trained in prescribed presentation and writing technique (M= 31.30) than those who have written the paper without any training (M=9.73), (t (28) =10.5318, $p < 0.0001$) with an associated standard error of difference = 0.979. The findings implied that marks secured by students in university examination are influenced by presentation format and writing technique having almost same pre-defined content when assessed by different evaluator. Also training the students to develop an effective presentation and handwriting technique will enable them to produce a legible and fluent personal style enhancing grades in University exams.

The remaining of the paper is organized as below; in Section II we elaborate the structure and function of Solapur University examination. In Section III presents the related work on handwriting programs and IV we give details of research questions, V methodology respectively. The results are in section VI followed by discussion and conclusion in section VII.

II. Structure and Functions of Solapur University Examination Center

For the purpose of simplification, smooth and easier functioning, the work of Examination Center is divided into following three parts, on functional basis:

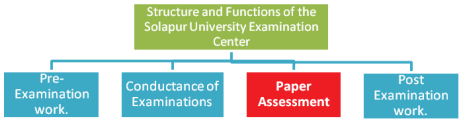


Fig. 1. Structure and Function of Solapur University Exam Center

A. *Pre-Examination work.*

Receiving manuscript of Question Papers from Paper-setters and marking scheme.

B. *Actual conductance of Examinations*

C. *Paper Assessment.*

1) *Coding of manuscripts of Question Paper,*
   - *a)* Printing of Question Papers
   - *b)* Making arrangement for sending it o the various examination centres.
2) *Assessments of Answer sheet*
   - *a)* Appointment of authorized Paper Evaluator for concerned subject
   - *b)* To make available the question papers
   - *c)* Provide model answers
   - *d)* Provide scheme of marking
   - *e)* Evaluate the answer sheet as per the model answer.
3) *Cross Moderation.*

D. *Post Examination work.*

1) Process the result on computers/manually
2) To declare the results of various examinations
3) To send the result etc. to the colleges concerned

In our experiment we have followed the same procedure for conducting post test theory exam. This includes paper setting and evaluation of answer sheet form university appointed faculty for computer graphic subject.

III. Related Work

Before you begin to format your paper, first write and save the content as a separate text file. Keep your text and graphic files separate until after the text has been formatted and styled. Do not use hard tabs, and limit use of hard returns to only one return at the end of a paragraph. Do not add any kind of pagination anywhere in the paper. Do not number text heads-the template will do that for you.

Multiple studies have found that difficulties with handwriting can affect students' grades. A teacher judge and grade students based on the appearance of their work, and the world judges adults on the quality of their handwriting [1]. Research [2] has showed that illegible handwriting is found to have secondary effects on school achievement and self-esteem. In [3] discuss handwriting speed was a factor in student achievement, regardless of ability. At all ability levels students who achieved higher-than-expected GCSE English grades had a better handwriting style than those who underachieved. Although this study does not offer evidence of cause and effect, the evidence suggested that handwriting quality and quantity are strongly associated with examination achievement at all but the very highest levels of ability. Briggs [4] showed that when teachers were given papers to evaluate, varying only in their degree of legibility, the papers with better handwriting received better grades (Markham, 1976; Sloan & McGinnis, 1982).

In 2006, [5] reported 81 percent of a sample of 431 corporate human resource professionals and senior executives listed applied skills in written communication as being deficient among U.S. high school graduates. Writing was the area of greatest deficiency noted for both applied and basic skills among recent high school graduates. Among basic skills, more survey respondents (72 percent) cited deficits in writing skills than deficits in mathematics (54 percent) or reading (38 percent). In [5,6] Corporations and state governments report that poor writing skills are a barrier to hiring and promotion for many individuals and that remediating problems with writing imposes significant operational and training costs on their organizations. In response to the perceived neglect of writing in U.S. education, the National Commission on Writing proposed a set of recommendations for making writing a central element in school reform efforts (National Commission on Writing 2006).Findings from the above [1, 2, 3, 4] reported that, these experiments were conducted at elementary level for primary and secondary education in countries other than India. Also [5,6] indicates that problems with handwriting legibility can have an impact on students' academic success and recruitment process.

However there is no experimental data on the assessment bias influenced by presentation format and writing technique in engineering education. However the problem with assessment of engineering papers in all universities and students obtaining less mark in University Examination is known ,but this problem is neither addresses by the respective universities nor engineering undergraduates students. So we feel that our study would be a useful contribution. As a faculty we have tried to optimize this problem and provide recommendations to students, faculty and university.

IV. RESEARCH QUESTIONS

Our experiment addresses several research questions related to assessment bias of answer sheet. At broad level our research question is: Are the marks secured by students in university examination influenced by presentation format and writing technique having almost same content?

This is operational zed into the following specific questions:

1) Does mark variation exist among different evaluators checking the same examination question paper ?

2) Does assessment bias influenced by presentation format and writing technique exist for almost the same question-answer assessed by different evaluators?

V. METHODOLOGY

A. Sample

The sample consisted of 60 students from second year engineering, form Walchand Institute of Technology, Solapur University Maharashtra. The students of control group were from Department of Computer Science & Engineering whereas the experiment group was from Information Technology studying Computer Graphics. Convenience sampling was used as joining the training was voluntary. The sample was divided into two groups as shown in Table I.

TABLE I. THE DISTRIBUTION OF PARTICIPANTS WITH TREATMENT

Group	Year	N
Control (CG)	Second Year C.S.E	30
Experimental (EG)	Second Year I.T.	30

B. Instrument

1) Post Test :

We used a paper-based post-test consisting of 5 compulsory theory question. We created the post-test based on the questions that have appeared in the previous year University Examinations on Computer Graphics for Second year Engineering exam. The post-test had 5 questions with a total of 45 marks, and having descriptive answer. Table II shows the question asked with the marks and type of question.

C. Procedure

In this section we describe the experimental design and method. We first explain the design of the experiment (sample distribution, control and dependent variables). Then we describe the steps to conduct the experiment (training module, arrangement).Next, we characterize the two treatment used for the experimental and control group.

1) Experimental Design:

We have two-group posttest- only randomized experimental design for our study. The control variable considered was the prescribed Xeroxed question and answer sheet given to both groups and the dependent variable was the grade. The independent variables were the paper evaluators. The dependent variable was operational zed by the marks achieved (score) in the post-tests.

TABLE II. MARK AND TYPE OF QUESTION IN POST-TEST

Sr. No.	Question	Content Type	Marks
1	Draw matrices for representing following operations. 1) Translation 2) Scaling 3) Rotation	Fact	05
2	Difference between Random Scan Display and Raster Scan Display	Comparative	08
3	Derive Bresenham's line drawing algorithm.	Procedure	10
4	Explain Cathode Ray Tube with diagram	Process	12
5	Explain midpoint subdivision algorithm.	Concept	10

2) Experiment Method

We followed the following steps to conduct the experiment. Figure 2 lists the step wise execution of the experiment.

a) Treatment :

Based on the treatment given, samples were specifically assigned to control and experimental group as shown in Table III.

TABLE III. THE DISTRIBUTION OF PARTICIPANTS WITH TREATMENT GROUPS

Group	Treatment	N
CG	Neither training nor any guidance on writing	30
EG	3 Day Workshop on prescribed effective presentation and writing technique	30

Treatment for experiment group : 3- Day Training Module

We conducted a 3 day workshop for experimental group to develop an effective presentation and handwriting technique. The workshop included the following elements

1. Guidelines for effective presentation of the answer sheet.
2. Instruction in handwriting technique and style in terms of the following qualities:
   a. legibility—formation, spacing, shape, size and slope
   b. aesthetic appeal
   c. speed and fluency
3. Practice in correct posture and paper placement
4. Followed by 3 day practice session after the training.
5. Worksheet exercises

b) Arrangement

The control and experimental groups were tested in separate rooms. Both the groups were provided comfortable desk and chair of correct height for writing properly.

c) Experiment Execution

The post tests were conducted on two different days with same time (04:30 p.m. to 5:30 p.m.) and duration (60 minutes). The details are:

Control Group – Day 1:

- What the instructor does:
  i. Distributes the question paper and answer sheets to the students.
  ii. Allots Exam seat code to be written on the answer sheet.
  iii. Instructs not to mention name class on the paper.
  iv. Provides handout of the same question paper and the complete answer solutions of 45 marks.
  v. Made the students sit in a row column arrangement and write the answer to the question as the sequence given in front of the row.
  vi. Instructed the students to replicate the answer as it is from the handout on to the answer sheet in the sequence mentioned in front of the rows.
  vii. The duration of the test was 60 minute as per university exam.
- What the students do :
  i. The students have written the answers by copying from the handout
  ii. The students answered the question as per the instruction given by the instructor.

Experimental Group – Day 2:

- What the instructor does:
  i. Distributes the question paper and answer sheets to the students.
  ii. Allots Exam odd numbers seat code to be only written on the answer sheet.
  iii. Instructs not to mention name class on the paper.
  iv. Provides handout of the same question paper and the complete answer solutions of 45 marks.
  v. Made the students sit in a row column arrangement and allotted the even seat numbers
  vi. Instructed the students to write the question paper as per the training given to them to write effectively in prescribed presentation format and writing skill.
  vii. The duration of the test was 60 minute as per university exam.

- What the students do :
  i. The students have written the answers as they were trained to write and present as per the guidelines given in the 3 day workshop.
  ii. The students answered the question in sequence as per the instruction given by the instructor

d) Posttest:

To determine the effect of effective presentation and writing skill we evaluated the post test papers from both the groups by the respective evaluators. A total of 60 answer sheets were equally distributed among 3 paper evaluator. These evaluators were appointed evaluator from Solapur University who have taught Computer Graphics subject more than three times and assessed Computer Graphics University papers

VI. RESULT ANALYSIS & DISCUSSION

To address the research questions, data was analyzed using an Independent Samples T-Test with statistical significance set at 0.05. The results of t-test for an effective presentation and handwriting technique were analyzed as follows.

1) Are the marks secured by students in university examination influenced by presentation format and writing technique having almost same subject knowledge ?

There were 30 trained and 30 non trained students in both experimental and control group. The distribution of post-test scores for the experimental and control group and their means are shown below.

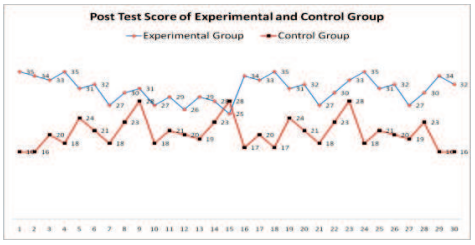


Fig. 2. Post test Scores of Experimental and control Group

Group	Experimental Group	Control Group
Mean	31.03	20.62
SD	3.03	3.49
SEM	0.55	0.65
N	30	29

TABLE IV. MEANS OF VERBAL LEARNER IN EACH GROUP

We independently analyzed the effect of prescribed presentation and writing technique trained in experimental group and non trained students in control group. The results showed higher performance on the post test scores of the experiment group trained in prescribed presentation and writing technique (M= 31.30) than those who have written the paper without any training (M=9.73), ($t(28) = 10.5318$, $p < 0.0001$) with an associated standard error of difference = 0.979. It was found that difference in means to be extremely statistically significant when prescribed presentation and writing technique was implemented.

1) Does mark variation exist among different evaluators checking the same examination question paper ?

The post test papers were equally distributed among 3 paper evaluators for assessment .The mean marks of each question for each evaluator was calculated and compared with

the target marks. The distribution of the mean marks for each evaluator is shown below.

TABLE V. TARGET MARKS AND MEAN MARKS OF EVALUATOR

		Group 1	Group 2	Group 3
Evaluator Students		Evaluator 1 1-20	Evaluator 2 21-40	Evaluator 3 41-60
Question No	Target Marks	Mean Marks	Mean Marks	Mean Marks
Q1	5	4	3	2
Q2	8	7	7	5
Q3	10	7	5	6
Q4	12	12	10	9
Q5	10	8	8	6

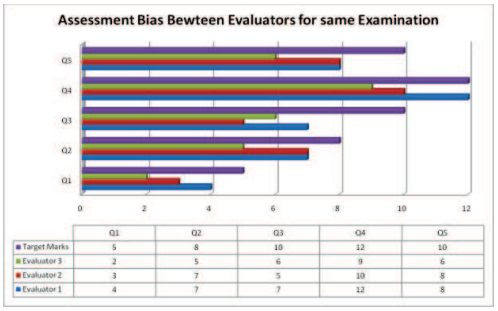


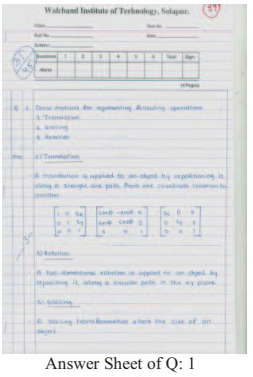
Fig. 3. Assessment Bias Between Evaluators

The mean distribution of mark for all answers shows that variation exists among the three evaluators checking the answer sheet with almost same content.

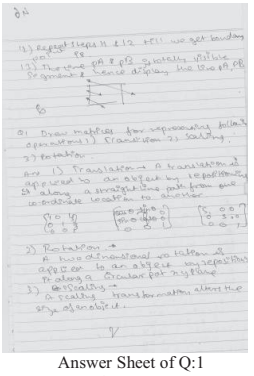
As both the groups were given the handouts of the solution to the question paper there was absolute no cognitive load on the students. The content in each of the answer sheet was same word to word as all the students had only replicated and written it. Figure 6 shows that when 3 evaluators were given papers to evaluate, varying only in their degree of legibility, the papers with better handwriting received better grades as compared to the one that were not presented and written effectively.

2) Does assessment bias influenced by presentation format and writing technique exist for almost the same answer assessed by different evaluators?

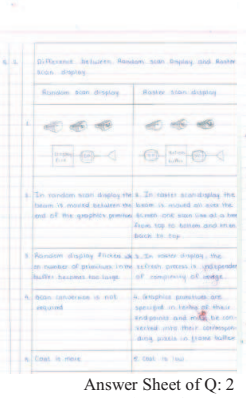
Paper evaluators assessed the answer sheets from both the groups. To address the above research question we have taken the snapshots of all five answers written by the students from the experimental and control group. Figure 7 shows the bias for the question 1 between the 3 evaluators for almost the same answer.



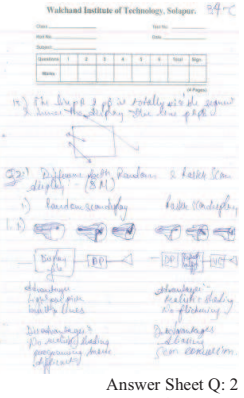
Answer Sheet of Q: 1 (Experimental Group)



Answer Sheet of Q:1 (Control Group)



Answer Sheet of Q: 2 (Experimental Group)



Answer Sheet Q: 2 (Control Group)

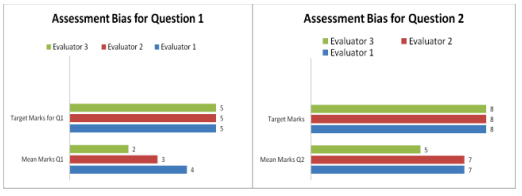
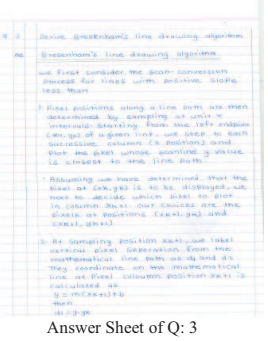
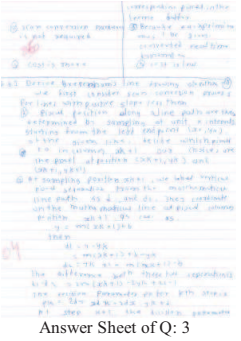


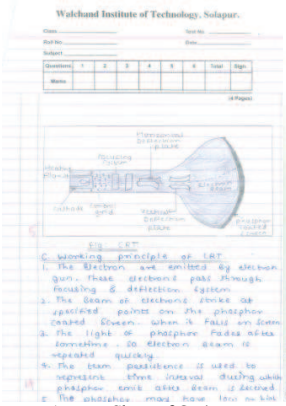
Fig. 4. Assessment Bias for Q1 & Q2 answer



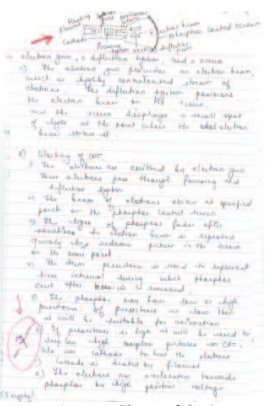
Answer Sheet of Q: 3 (Control Group)



Answer Sheet of Q: 3 (Experimental Group)



Answer Sheet of Q: 4
(Experimental Group)



Answer Sheet of Q: 4
(Control Group)

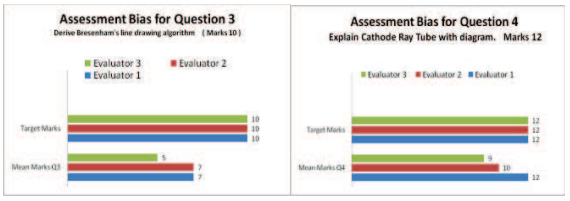
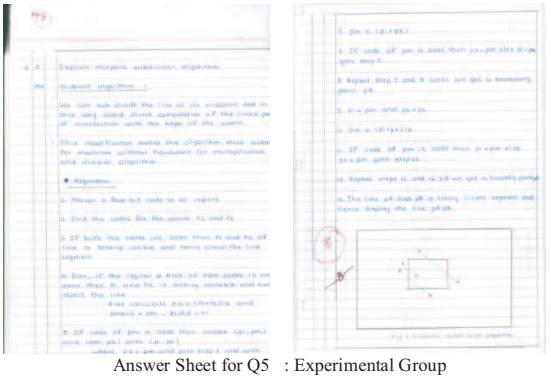


Fig. 5. Assessment Bias for Q3 &Q4 answer



Answer Sheet for Q5 : Experimental Group
Answer Sheet for Q5 : Control Group

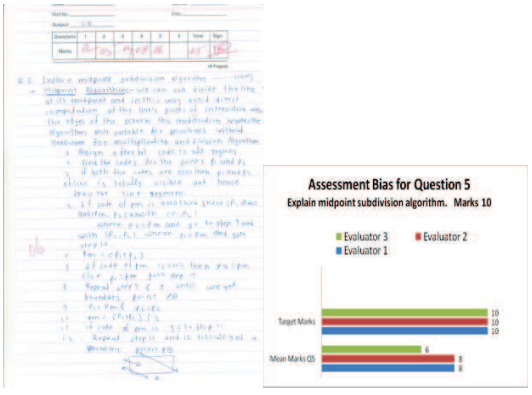


Fig. 6. Assessment Bias for Q5 Answer

From the above presentation style and effective writing it is observed that in spite of students replicating and writing the same answers ,assessment bias among the same question assessed by different evaluators is influenced by presentation format and writing technique. This study evaluates the effect of presentation style and effective writing technique for engineering students. students who achieved higher-than-expected grades had a better handwriting style than those who underachieved. Although this study does not offer evidence of cause and effect, the evidence suggested that handwriting quality and quantity are strongly associated with examination achievement at all but the very highest levels of ability. To our knowledge, this is the first study that investigates and provides student the way to overcome the effect of assessment bias influenced presentation format and writing technique in India in engineering education.

Our findings will benefit those students who have suffered academically because of bad presentation and poor writing in spite of correct content. Also help improve in enhancing their university percentage by undergoing writing and effective presentation practice. We also suggest university administration to make and follow practices to instruct evaluator assess the paper based on content and not on only appearance. Also university should set standard and conduct faculty workshops for paper assessment.

VII. CONCLUSION

Problems of paper assessment do exist across universities of engineering education. These have to be tackled at two ends: at student-faculty side and University assessment side. Our research demonstrated to tackle the problem from student-faculty side by providing training in prescribed presentation format and writing technique to enhance student marks in university examination

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