COMPUTER-BASED VS PAPER-BASED EXAMINATIONS: PERCEPTIONS OF UNIVERSITY TEACHERS

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ABSTRACT
This research reported teachers' perceptions about computer-based (CB) vs. paper-based (PB) examinations. Teachers were divided into 7 major categories i.e., gender, departments, designations, qualifications, teaching experiences, computer training certifications and CB examination experiences, which were the key factors to be observed and analyzed to perceive teachers' attitude regarding CB or PB examinations. It was concluded from the results that overall sampled teachers' attitudes were positive towards CB examination systems but in some situations they preferred PB as well. Comparatively female, highly ranked, highly qualified, less experienced, teachers who have computer training certificate or degree, and teachers who have CB examination experiences were more positive towards CB examinations.

INTRODUCTION

It is generally recognized that examinations determine the extent to which educational objectives have been achieved as well as the extent to which educational institutions have served the needs of community and society (Shah, 2002). Examinations are not limited to measure educational or societal objectives and needs but incorporate in a way of coping with the educational system (Havens, 2002). Rehmani (2003) briefly described that 'examinations play a significant role in determining what goes on in the classroom in terms of what, and how teachers teach and students learn and can have impact on both teaching and learning'. Wikipedia used test or examinations as alternative terms of assessment and defined it as: 'test or an examination (or exam) is an assessment indeed to measure a test-takers knowledge, skill, aptitude, physical, fitness or classification in many other topics'.

Various examination methods used in higher education institutions to assess academic progress, for example, paper-pencil-based examinations, assignments, presentations, and etc.,. Sim, Holifield, & Brown (2004) identified more than fifty varied techniques used within higher education for assessment purposes; the most commonly used are examinations. The rapid advancement of Information and Communication Technologies (ICT) in teaching and learning has shifted the paradigm (Uysal & Kuzu, 2009) from paper-pencil-based to computer-based system of examinations which are usually termed as Computer Assisted Testing, Computerized Assessment, Computer Based Testing (CBT), Computer Aided Assessment (CAA), Computer Based Assessment (CBA), Online Assessment, E-Assessment and Web-Based assessment (Bull (1999), Haslington, Jupp (2000), Mckenna (2001), Elliot (2003), Maddison (1983), Winship (2003), JISC (2008) and many others). Computer – based examinations are the form of assessment in which the computer is an integral part of question papers' delivery, response storage, marking of response or reporting of results from a test or exercise (Whittington, Bull & Danson, 2000). Conole and Warburton (2005) defined CAA as 'the use of computers for assessing students' learning'.

Due to the inclusion of ICTs in education, it is required to re-consider and rethink, modify or change the traditional examination methods. Electronic assessment tools had reduced the burden of teachers and facilitate to conduct examinations purposefully. Computer-based examinations can be used to promote more effective learning by testing a range of skills, knowledge and understanding. Accessing and managing of information and managing and developing communication skills are possible to assess online which cannot be assessed in regular essay based examinations (Brown, Race, & Bull, 1999). JISC (2008) quoted Weaver (2003) that '… diversity decreases the dependency on the traditional formal examination, a method that does not suit the learning styles of many students. The key factor in determining whether an assessment program is good depends on whether the assessment tasks are relevant to the aims and intended learning outcomes for the course, not forgetting the attitudes and skills that are to be tested'.

Computer and related technologies provide powerful tools to meet the new challenges of designing and implementing assessments methods that go beyond the conventional practices and facilitate to record a broader repertoire of cognitive skills and knowledge. According to Bodmann and Robinson (2004) computer-based tests offers several advantages over traditional paper-and-pencil or paper-based tests. Technology based assessment provide opportunities to measure complex form of knowledge and reasoning that is not possible to engage and assess through traditional methods. The link between observation and interpretation through computer based technologies makes it possible to score and interpret multiple aspects of student performance on a wide range of

tasks chosen for cognitive features and compare the results against profiles that have interpretive value (Pellegrino, Chudowsky, and Glaser, 2001). Computer based assessment technique is becoming more and more common in HEIs because of its relevance and direct approach towards CAI. According to Conole and Warburton (2005): "CAT items are written to test particular levels of ability they have the potential to deliver more accurate and reliable results than traditional tests". Traditional methods of assessment are being replaced by automated assessment in all over the world gradually but it is not clear yet to up to what extent these changes will be fruitful to the academicians and administrators of HEIs (McAlpine, 2004).

Therefore, it was significantly important to perceive university teachers' approaches towards Computer-Based (CB) and/or Paper-Based (PB) examinations. It was observed through literature that little attention was paid to understand teachers' thoughts about how they differentiate between CB and PB examinations in terms of their effects on teaching and learning. Authors of this research, therefore, analyzed teachers' attitude in new and different dimensions or categories i.e., not only limited to gender-based attitudinal differences but also discipline-wise, designations-wise, qualifications-wise, teaching experiences-wise, Computer Skilled (trained) and non-skilled (untrained) teachers and the teachers who EXPERIENCED to conduct CB examinations versus to those who NEVER experienced. Following is a brief literature review that summarizes the studies of those authors who experimented or surveyed CB examinations versus PB examinations at higher educational institutions.

LITERATURE REVIEW

According to Fluck, Pullen & Harper (2009) '… educators must consider which assessment techniques permit students to utilize the affordances of new technology'. The authors conducted an eExamination for the students of 4-year Bachelor of Education Program at the University of Tasmania. Students' (N=270) achievement was assessed through two equally weighted activities: first was a home assignment in which students explored learning content through the use of ICT and the second activity was a 2 hour test comprised of 14 questions based on all the material in the unit. At the end of the test, a single page survey with five questions was offered to students. Survey indicated that 38% of the survey respondents had previously taken a CB exam, 78% had used the practice CD before eExamination and 71% had found it very or moderately useful. The valid responses (N=230) indicated that 94.5% preferred CBT. The prior exposure to CBT was a highly significant factor for preferring the computer medium.

Karadeniz (2009) studied the impact of paper based, web based and mobile based assessment on students' achievement. A group of 38 students were experimented for 3 weeks. Significant differences were found between the scores achieved by the students in second week, but not in first week. It was perceived by the authors that students had positive attitude towards web based and mobile based assessment due to ease of use, comprehensive and instant feedback. Moreover, most favoured tests were web based and the least favoured were paper based.

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The National University of Singapore introduced computer-based testing (CBT) in 2004. Lim, et al (2006) examined medical students' attitude about CB VS PB testing. Through an online survey 213 (53.5%) final-year MBBS students were tested out of which 91 (79.8%) preferred CBT, 11 (9.6%) preferred paper-and-pencil (PNP) format and 12 (10.5%) were un-sure. Authors further explained that 42 indicated that 42 liked CBT because of good quality of images and independent of assigned seating positions; 22 liked because they could proceed at their own pace; one stated that CBT examinations was fun; 4 enjoyed the convenience of CBT and 6 cited "equality" as the reason they preferred CBT over PNP testing.

Bodmann and Robinson (2004) conducted an experimental study to compare speed and performances differences among computer-based (CBTs) and paper-pencil tests (PPTs). In experiment fifty-five undergraduate students enrolled in the subject of educational psychology, participated in the studies which were already familiar with computer-based tests. Both CBTs and PPTs contained 30 MCQs items with 35 minute of time limit. Approximately half class (28 students) took the first test on the computer and rest preferred first test on paper. Procedures shifted for the second tests, with the first group receive PPTs and second group CBTs with a gape of two weeks. It was concluded that undergraduates completed the CBT faster than PBT with no difference in scores.

Koppel and Hollister conducted a study to examine the impact on student performance of a computer-based assessment (CBA) as compared to a traditional testing method. Three different research tool were used in the study to collect and interpret results i.e., questionnaires completed by students to express their CBA experiences; faculty interviews who had administered computer-based test to determine students' perceptions of using this medium of testing and analysis of students test scores in both conventional paper-based tests (PBT) and CBA.

Total 133 students out of which 91 have no prior experience of CBA and remaining 42 had experienced the same in their previous courses. The Excel CBA was comprised of 25 items was constructed. Students' scores on CBA were automatically recorded which included overall scores achieved. Grades on CBA were based on students' ability to complete a specific skill-based operation in the application of MS Excel. CBA was administered in one class period, at the end of the exam students reviewed their results. PBT was administered in the next class period. The PBT were examined manually by viewing the printout and actual Excel file containing the completed examinations. Results of PBT were recorded physically by noting the required information in an Excel sheet. Grades on the PBT were based on the final product submitted by each student as opposed to how each task was performed. On the question of ease of use, majority of the students (59%) found the software to be easy, 29% found it to be moderate and 12% the software to be somewhat difficult to use. Interpreting the range of skills, 76% responded that CBA was more effective test. Evaluating the difficult of question paper 65% responded that question paper were moderated, 34% of the students felt the automatic grading system was fair while 39% didn't find the grading fair. Only 19% felt that CBA negatively impacted their performance. Only 14% students found CBA easier while 49% found it difficult or more difficult. Total 58% preferred CBA and 42% preferred PBT. Faculty perceived to be more positive towards CBA in terms of less time writing exams, reduce grading time, simple method of record keeping of grades and improved validity of test validity through post-test statistical analysis.

Calarina and Wallace (2002) investigated to confirm several key factors in computer-based versus paper-based assessment. Factors of the study were content familiarity, computer familiarity, competitiveness, and gender. The study used a post-test only designed with one factor, test mode (Computer-based and paper-based). Students' score on 100-item multiple choice items and students' self-report on a distance learning survey were treated as dependent variables. Four sections of Computer Fundamental Course consisting of 105 students were selected as sample of the investigations. Results showed that computer-based test delivery impacted positively on students' scores as compared to paper-based test. From the abstract of the study, it was found that ANOVA of test data showed that the computer-based test group outperformed the paper-based test group. Gender, competiveness, and computer familiarity were not related to this performance difference, though content familiarity was.

THE STUDY

Instrumentation: A survey was designed for which all items of the instrument were couched and included after the literature review. The instrument was comprised of three parts. Part – 1 was related to teachers' demographic information i.e., department name, gender, designation (i.e., job tile) and professional qualifications. Two variables regarding the information for computer training certificate or diploma and experience of conducting CB examination were also included in the same part. 5 – Point attitude scale comprised of 21 items was included in the questionnaire as Part – 2 to explore teachers' attitude towards CB examinations on the basis of their personal experiences. And Part –3 contained 19 statements, which were designed to depict teachers' perceptions by comparing PB versus CB examinations, same on the bases of their personal experiences. This part helped the researchers to understand teachers' belief on PB or CB examinations.

Instrument Validity: To assess the validity, the instrument was piloted among 5 randomly selected teachers of 3 different departments i.e., Education, Physics and Business & Administration. Responses, views, and difficulties to complete the questionnaire from 30 teachers including 18 male and 12 females, were collected and recorded instantly by the researchers themselves and then thoroughly discussed with the experts. Changes were made accordingly and the final draft of the questionnaire was sent to the six different experts in the field of Education and Assessment for validating the instructions and necessary amendments.

Sampling: In 2008 there were 111 (i.e., 60 Public Sector and 53 Private Sector) universities in Pakistan (Higher Education Commission, Pakistan, 2008) out of which 36 (i.e., 20 Public Sector and 16 Private Sector) universities from Punjab Province were delimited for the study. Out of 20 Public Sector Universities, 8 (40%) were included in the sample randomly. Private Sector Universities were dropped because of the limited number of students, and the variety of different and technical disciplines offered by different universities. All male and female teachers from all teaching departments of different disciplines of sampled universities during session 2008 – 2010 constitute the population of this study. After the selection of the universities, different teaching departments of Pure Sciences, Social Sciences and Professionals were included in the study on the basis of random sampling technique. However, teachers of each department were selected on the basis of 'availability' in their offices. Permission was sought from the head of departments in each university in advance for said purpose. In all, 410 teachers were asked to complete the questionnaire. Out of which 314 (77%) questionnaires were recollected successfully after completion. Therefore, the resultant sample consisted of 314 teachers.

Response Rate & Data Analysis: Table – 1 showed detail of 314 teachers' response rate in terms of frequencies and percentages. To analyze data purposefully, demographic data of university teachers were categorized as (gender, discipline, designation, qualifications, teaching experience, computer literate/trained and experience of conducting CB examinations). Disciplines included following sub-groups: Pure Sciences (i.e., Bio, Chemistry, Physics, and Mathematics), Social Sciences (i.e., Economics, Education, and Psychology) and IT Professionals (i.e., MBA IT, Computer & Information Technology, and E-Commerce). Designations-wise distributed teachers were: Low Ranked (i.e., Lecturers and Assistant Professors) and High Ranked (i.e., Associate Professors and Professors). Qualifications-wise categories were: Less Qualified (i.e., M. A./M. Sc./M. Ed., and M. Phil) and Highly Qualified (i.e., Ph. Ds and Post Docs.). First category of teaching experience was from 1-9 years (Less Experienced) and second from 10 or more than 10 years (High Experienced). And the responses of last two groups were in the form of YES or NO. Moreover, simple percentages and Chi Square tests techniques were used to analyze data statistically. The data were interpreted on the bases of overwhelming majority (85% and above), good majority (70% to 84%) and simple majority (55% to 69%) with respect to all categories given in questionnaire.

FINDINGS & CONCLUSIONS

Part – II of the Questionnaire

Table 3 displayed attitudinal differences of each sampled group of teachers in terms of overwhelming, good majority, and simple majority responses.

From the given table it was depicted that overwhelming majority of sampled teachers; male & female teachers; teachers from natural and social sciences; low ranked teachers; less qualified teachers; less experienced & more experienced teachers; teachers who have & haven't CB examination experiences were strongly agreed that HEC Pakistan should plan to train university teachers for conducting CB examinations to enable them to assess large group of students in less time.

It was portrayed from Table 3 that good majority of sampled teachers (i.e., overall sampled teachers, male teachers, low & high ranked teachers, less & highly qualified teachers, less & more experienced teachers, teachers who have no computer training certificate, and teachers who have & have no experience of CB examinations) were agreed with the authors of the research that CB examinations are demanded due to the semester system which facilitate all stakeholders i.e., teachers, students and administrators.

It was illustrated from the same table that simple majority of sampled teachers (i.e., overall sampled teachers, female teachers, low ranked teachers, less & highly qualified teachers, less & more experienced teachers, teachers who have & have no computer training certificate, and teachers who have no experience of CB examinations) were agreed that CB examinations saves time and also facilitate the students to improve their understanding which ultimately improve their GPA therefore a country-wide policy should be prepared at university level regarding CB examinations.

Results in the column of Overwhelming Majority Responses facilitate the researchers to compare responses within the groups with respect to the percentages. It was found that female teachers, teachers from social sciences departments, highly ranked teachers, highly qualified teachers, less experienced teachers, teachers who have computer training certificate or degree, and teachers who have CB examination experiences were comparatively more positive towards CB examinations.

Percentages in the column of Good Majority Responses demonstrated that male teachers, teachers from natural sciences departments, highly ranked teachers, highly qualified teachers, less experienced teachers, teachers who have computer training certificate or degree, and teachers who have no CB examination experiences were comparatively more positive towards CB examinations.

Percentages in the column of Simple Majority Responses pointed out those teachers from IT, low ranked teachers, highly qualified teachers, more experienced teachers, teachers who have not computer training certificate or degree, and teachers who have no experience of CB examinations were more interested in CB system of examinations. While no major differences were found in the percentages of male and female teachers.

Table 6 indicated the significant and insignificant results between the attitudes of sampled teachers group-wise for each statement. Significant differences (χ^2 = 11.698>5.966, α=0.05, Sig.=0.003) were found between the attitudes of male and female teachers in 15th statement of the questionnaire. Percentages of the statement showed that 33% female and 42% male were agreed while 43% female and 49% male were disagreed. Due to the minor

differences in percentages, it was not possible to declare whether male or female were more inclined towards CB examinations.

Significant differences were found between the attitudes of teachers from different departments in statements 6th (χ^2 = 10.502>9.49, α=0.05, Sig.=0.033), 8th (χ^2 = 13.729>9.49, α=0.05, Sig.=0.008), and 13th (χ^2 = 11.287>9.49, α=0.05, Sig.=0.024). In statement 6, it was clear from percentages that good majority (70%) of social science teachers, simple majority of IT professionals (65%) while 51% from natural sciences disciplines disagreed with the statement that CB testing is a worst tool of assessment. Same in statements 8 and 13, drastic difference were found between the calculated percentages.

Significant differences were found between the attitudes of low ranked and high ranked teachers in statement 20 (χ^2 = 8.132>5.99, α=0.05, Sig.=0.017). From calculated values it was clear that both groups recommended preparing a master plan to introduce CB examinations at national level. But overwhelming majority (88%) of low ranked teachers and good majority (73%) of high ranked teachers showed major attitudinal difference among the same groups.

Significant differences were found between the attitudes of teachers from different level of qualifications in statements 3rd (χ^2 = 7.867>5.99, α=0.05, Sig.=0.020), 6th (χ^2 = 8.651>5.99, α=0.05, Sig.=0.013), and 9th (χ^2 = 6.883>5.99, α=0.05, Sig.=0.032). From calculated values of statement 3, it was clear that both groups were agreed that computer facilitated in minimizing clerical mistakes. But percentages (i.e., 88% highly qualified and 78% less qualified) showed major attitudinal difference among the same groups. Same in statements 6 and 9, sweeping difference were found between the calculated percentages.

Significant differences were found between the attitudes of teachers from different level of teaching experiences in statements 3rd (χ^2 = 7.282>5.99, α=0.05, Sig.=0.026) and 11th (χ^2 = 8.651>5.99, α=0.05, Sig.=0.016). From calculated percentages of statement 11, it was clear that an overwhelming majority of both groups were agreed that CB examinations facilitate to assess more students in less time. But percentages (i.e., 86% highly experienced and 99% less experienced) showed less experienced teachers were more in CB examinations with respect to the given statement.

Part – III of the Questionnaire

Table 5 displayed results of each sampled group of teachers in terms of overwhelming, good majority, and simple majority responses.

An overwhelming majority of overall sampled teachers, female teachers, teachers from the group of social sciences & IT professionals, high ranked, less qualified teachers less experienced teachers and those teachers who have any type of computer training certificate or degree were strongly agreed with the statement that CB examinations seems to be very interesting technique of assessment but even then it's difficult for teachers to construct objective type question papers for the same system of examinations. While same majority of all other groups of sampled teachers were highly anxious about the difficulty of constructing items for CB examinations.

Good majority of overall sampled teachers, female & male teachers, teachers from IT profession, low ranked teachers, less experienced, teachers who have computer training certificate or degree and teachers who haven't CB examinations experiences expressed that CB examination system is risky because of system failure or light failure problems during examinations even then it's an interesting technique of examinations for students. Not only this, they also believe that CB examinations can affect the entire educational system positively in terms of innovation and modern changes in teaching and learning methods.

Simple majority of overall sampled teachers, female & male teachers, low ranked teachers, less qualified teachers who have & have not computer certificate or degree teachers who have & have not CB examinations experiences articulated that CB examination systems could have flaws in terms of constructing different form of test items i.e., fill in the blanks, MCQs, matching items, or short answers but even then they agreed that they could frequently assess their students during session through this technique of assessment.

Not a single responded item of the questionnaire was found in the column of overwhelming majority of PB examinations. This concluded that they were highly inclined towards CB examinations. This was verified by good majority of sampled teachers from all groups except female teachers, teachers from the group of IT profession, more experienced and teachers who have no computer training certificate or degree expressed that administrators of their institutions are trying hard to bring change in PB examinations systems.

Simple majority of overall sampled teachers, female & male teachers, teachers from social, natural sciences, low ranked teachers, teachers who have and have not certificate or degree and teachers who have no experience of CB examinations expressed that PB examinations systems is beneficial and easy to manage because results are more accurate in same system of examinations.

Column-wise interpretations of Table 5 helped to compare and conclude that overall sampled teachers were in favor of CB examinations, female teachers, teachers from social science group, highly ranked teachers, highly qualified teachers, more experienced teachers, and teachers who have CB examination experiences were found to be more interested in CB system of examinations as compared to other peered groups.

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Appendices

Table – 1: Group-wise Percentages of Overall Sampled Teachers

Categories	Groups	(n) Percentage
Gender		
	Female	(140) 45%
	Male	(174) 55%
Departments		
	Natural Sciences	(123) 39%
	Social Sciences	(093) 30%
	IT* Professionals	(098) 31%
Designation (i.e., Job Tile)		
	Low Ranked: Lecturers + Assistant Professors	(277) 88%
	Highly Ranked: Associate Professors + Professors	(037) 12%
Qualifications		
	Less Qualified: M. A/M. Sc + M. Phil/MS	(247) 79%
	Highly Qualified: Ph. Ds + Post Docs	(067) 21%
Teaching Experiences		
	Less Experienced: 1 – 9 Years	(241) 77%
	More Experienced: 10 and above	(073) 23%
Computer Training Certificate		
	No	(177) 56%
	Yes	(137) 44%
Experience of CB Examination		
	No	(293) 93%
	Yes	(021) 07%

*IT = Information Technology

Table – 2: List of Statements/Items included in Part – II of the Questionnaire

S. No. *	Statements
1.	CB examinations save time.
2.	Online self-assessments help students to improve their understanding and GPA.
3.	Using computer in preparing and declaring results minimizes clerical mistakes.
4.	CB examinations are insecure technique of assessment.
5.	Results of CB examinations are always invalid.
6.	Computer-based testing is a worst tool of assessment.
7.	CB examinations are demanded due to semester system.
8.	Using computers in examinations does not have any effect on students.
9.	Teachers should be trained for using computer in examination.
10.	New technological-based assessment methods should be used to analyze students' progress.
11.	CB examinations facilitate to assess more students in short time.
12.	Online examination technique should be limited to classroom tests.
13.	CB examinations facilitates all e.g., administrators, teachers and students.
14.	Computer-based papers reduce cheating by a difficult shuffle of questions available for each student.
15.	Paper free environment slashes cost.
16.	Computer negatively effect on thinking potential of students' during paper.
17.	A country-wide policy should be prepared for CB exams at university level.
18.	Both systems of examinations should be kept parallel.
19.	It is not possible in Pakistan to apply CB system of exams in its real form i.e., construction, administration, delivery and marking via computer, in all universities.
20.	HEC Pakistan should make a master plan to introduce CB examination at national level.
21.	In order to implement CB examinations, all institutions are required to improve their teaching techniques.

Table 3: Group-wise Responses of Teachers for all Statements of Part – II of the Questionnaire

Group No	Overwhelming Responses in Statements (%):	Good Majority Responses in Statements (%):	Simple majority Responses in Statements (%):
Overall Sample	9 (89%), 11 (89%), 20 (87)	3 (80%), 7 (74%), 10 (83%), 13 (74%), 18 (70%), 21 (82)	1 (66%), 2 (62%), 4 (64%), 6 (61%), 14 (63%), 16 (66%), 17 (59%), 19 (69%)
Female	9 (90%), 10 (85%), 11 (87%), 20 (90%), 21 (87%).	3 (75%), 7 (75%), 18 (71%).	1 (60%), 2 (63%), 4 (58%), 5 (56%), 6 (63%), 14 (57%), 16 (68%), 17 (61%), 19 (68%)
Male	9 (88%), 11 (91%), 20 (84%).	1 (70%), 3 (84%), 7 (73%), 10 (82%), 13 (75%), 19 (71%), 21 (79%)	2 (61%), 4 (68%), 6 (60%), 12 (56%), 14 (68%), 16 (64%), 17 (57%), 18 (68%),
Natural Sciences	9 (86%), 11 (86%), 20 (89%)	3 (77%), 10 (73%), 18 (72%), 19 (71%), 21 (83%)	1 (65%), 2 (64%), 4 (58%), 7 (81%), 16 (61%), 17 (62%)
Social Sciences	9 (90%), 10 (89%), 11 (90%), 20 (88%), 21 (86%)	3 (76%), 6 (70%), 13 (76%), 16 (73%), 18 (70%)	1 (67%), 4 (63%), 5 (55%), 7 (71%), 17 (63%), 19 (68%)
IT Prof.	3 (85%), 9 (91%), 10 (91%), 11 (93%)	4 (72%), 13 (82%), 20 (82%), 21 (78%)	1 (65%), 2 (67%), 6 (65%), 7 (67%), 8 (55%), 12 (57%), 16 (65%), 18 (66%), 19 (69%),
Low Ranked	9 (87%), 11 (88%), 20 (88%)	3 (78%), 7 (73%), 10 (84%), 13 (74%), 21 (83%)	1 (66%), 2 (61%), 4 (64%), 6 (60%), 14 (63%), 16 (64%), 17 (57%), 18 (69%), 19 (69%)
Highly Ranked	3 (91%), 9 (100%), 11 (100%)	7 (79%), 10 (77%), 13 (79%), 16 (77%), 17 (73%), 18 (78%), 19 (73%), 20 (73%), 21 (77%)	1 (59%), 2 (65%), 4 (65%), 6 (68%), 12 (68%), 14 (67%)
Less Qualified	9 (87%), 11 (87%), 20 (88%)	3 (78%), 7 (71%), 10 (83%), 13 (75%), 19 (70%), 21 (83%)	1 (68%), 2 (62%), 4 (65%), 6 (63%), 14 (63%), 16 (63%), 17 (57%), 18 (69%)
Highly Qualified	3 (88%), 9 (94%), 11 (95%)	7 (83%), 10 (83%), 13 (72%), 16 (74%), 18 (73%), 20 (81%), 21 (82%)	1 (55%), 2 (60%), 4 (59%), 12 (65%), 14 (64%), 15 (55%), 17 (66%), 19 (69%)
Less Experienced	3 (90%), 9 (93%), 11 (99%), 20 (88%), 21 (88%)	7 (76%), 10 (79%), 13 (80%), 14 (72%), 18 (75%), 19 (79%)	1 (61%), 2 (59%), 4 (61%), 5 (56%), 6 (69%), 12 (57%), 16 (66%), 17 (68%)
More Experienced	9 (87%), 11 (86%), 20 (86%), 21 (86%)	3 (77%), 7 (73%), 10 (84%), 13 (73%),	1 (67%), 2 (63%), 4 (65%), 6 (59%), 14 (60%), 16 (66%), 17 (57%), 18 (68%), 19 (69%)
No Certificate	9 (87%), 20 (90%)	3 (77%), 7 (78%), 10 (81%), 11 (84%), 13 (71%), 21 (82%)	1 (65%), 2 (59%), 4 (57%), 5 (56%), 6 (59%), 14 (60%), 15 (63%), 17 (56%), 19 (67%)
Yes, Certificate	9 (91%), 10 (85%), 11 (96%)	3 (83%), 4 (73%), 13 (79%), 18 (72%), 19 (73%), 20 (83%), 21 (83%)	1 (66%), 2 (66%), 6 (64%), 7 (69%), 8 (55%), 14 (67%), 15 (69%), 17 (63%),
No, CB Exams	9 (88%), 11 (89%), 20 (87%)	3 (78%), 7 (73%), 10 (82%), 13 (74%), 19 (71%), 21 (82%)	1 (66%), 2 (60%), 4 (65%), 6 (61%), 14 (61%), 14 (65%), 17 (57%), 18 (69%)
Yes, CB Exams	2 (86%), 3 (100%), 9 (100%), 10 (100%), 11 (95%), 14 (86%), 17 (86%), 20 (86%), 21 (95%)	7 (84%), 13 (81%), 15 (76%), 18 (81%)	1 (57%), 6 (62%), 12 (62%)

Table – 4: List of Statements/Items included in Part – III of the Questionnaire

S. No.*	Statements	CB	PB
1.	Students could be assessed more frequently in		
2.	Students could loose confidence in:		
3.	Which system could be more effective to create competition among students?		
4.	Which system seems to be more interesting technique?		
5.	Which system of examination could be more interesting for students?		
6.	Which system of examination could have more flaws?		
7.	Which system of examination is easy to manage?		
8.	Which system of examination is more expensive?		
9.	Which system of examination could produce more accurate results?		
10.	Which system of examination is more beneficial in all respects?		
11.	Educational institutions may work more smoothly under which system of examination?		
12.	Which system of examination is more risky?		
13.	Which system of examination could reduce teachers' work load?		
14.	Which system of examination supports to construct test items in different forms?		
15.	Which system of examination could be more relaxing for students?		
16.	Which system of examination affects the entire educational system more positively?		
17.	Administrators of my institution are trying hard to change for:		
18.	It could be difficult for teachers to construct test items for:		
19.	Which system of examination could be more supportive to achieve educational objectives positively?		

Table 5: Group-wise Responses of Teachers for all Statement of Part – III of the Questionnaire

	CB Examinations			PB Examinations		
Group No	**Overwhelming Responses in Statements (%):**	**Good Majority Responses in Statements (%):**	**Simple majority Responses in Statements (%):**	**Overwhelming Responses in Statements (%):**	**Good Majority Responses in Statements (%):**	**Simple majority Responses in Statements (%):**
Overall Sample	4 (85%), 18 (88%)	5 (72%), 12 (78%), 15 (77%), 16 (73%), 19 (81%)	1 (64%), 6 (65%), 8 (63%), 13 (68%), 14 (68%)	-	17 (71%)	7 (62%), 9 (65%) 10 (64%)
Female	4 (87%), 18 (87%)	5 (75%), 8 (73%), 12 (79%), 13 (73%), 15 (75%), 16 (72%), 19 (79%)	1 (63%), 6 (64%), 14 (68%)	-	-	7 (60%), 9 (66%), 10 (64%), 17 (69%)
Male	18 (88%)	5 (71%), 12 (77%), 15 (79%), 16 (73%), 19 (83%)	1 (64%), 3 (56%), 6 (66%), 8 (55%), 13 (64%), 14 (68%),	-	17 (73%)	7 (64%), 9 (64%), 10 (64%)
Natural Sciences	18 (85%)	4 (82%), 6 (74%), 12 (81%), 13 (79%), 14 (73%), 15 (75%), 16 (78%), 19 (81%)	1 (57%), 2 (57%), 3 (57%), 5 (69%), 8 (63%)	-	17 (74%)	7 (59%), 9 (67%), 10 (62%), 11 (65%)
Social Sciences	4 (88%), 18 (89%)	1 (74%), 5 (76%), 12 (70%), 15 (80%), 19 (80%)	8 (65%), 13 (57%), 16 (64%)	-	17 (71%)	2(55%), 9(57%), 10 (63%), 11 (64%),
IT Prof.	4 (86%), 18 (89%)	5 (73%), 12 (82%), 14 (75%), 15 (77%), 16 (74%), 19 (83%)	1 (63%), 6 (66%), 8 (61%), 13 (65%)	-	-	2 (57%), 9 (69%), 10 (66%), 11 (63%), 17 (67%)
Low Ranked	18 (87%)	4 (84%), 5 (71%), 12 (77%), 15 (77%), 16 (71%), 19 (81%)	1 (63%), 6 (65%), 13 (66%), 14 (66%)	-	17 (73%)	7 (63%), 9 (64%), 10 (64%), 11 (63%)
Highly Ranked	4 (94%), 5 (85%), 12 (85%), 16 (88%), 18 (94%)	8 (72%), 13 (82%), 14 (77%), 15 (84%), 19 (80%)	1 (69%), 6 (65%)	-	9 (74%), 11 (72%)	7 (57%), 10 (59%)
Less Qualified	4 (86%), 18 (85%)	5 (72%), 12 (76%), 15 (78%), 19 (81%)	1 (63%), 6 (65%), 8 (61%), 13 (66%), 14 (65%), 16 (69%)	-	17 (70%)	7 (66%), 9 (64%), 10 (67%), 11 (66%)
Highly Qualified	12 (86%), 16 (86%), 18 (96%)	4 (82%), 5 (75%), 8 (71%), 13 (77%), 14 (77%), 15 (74%), 19 (82%)	1 (67%), 2 (60%), 6 (65%)	-	17 (77%)	9 (67%), 11(58%)
Less Experienced	4 (86%), 18 (85%)	5 (71%), 12 (78%), 15 (75%), 16 (73%), 19 (78%)	1 (61%), 6 (65%), 8 (63%)	-	17 (76%)	1 (61%), 6 (65%), 8 (63%)
More Experienced	15 (85%), 18 (96%), 19 (90%)	1 (72%), 4 (82%), 5 (77%), 12 (78%), 13 (74%), 14 (70%), 16 (70%)	3 (56%), 6 (64%), 6 (64%)	-	-	9 (67%), 10 (61%), 17 (55%)
No Certificate	18 (86%), 19 (85%)	4 (81%), 8 (72%), 12 (82%), 13 (70%),15 (77%), 16 (72%)	1 (62%), 5 (69%), 6 (67%), 14 (69%)	-	-	9 (67%), 10 (64%), 11 (63%), 17 (68%)
Yes, Certificate	4 (90%), 18 (89%)	5 (76%), 12 (73%), 15 (78%), 16 (73%), 19 (76%)	1 (65%), 3 (60%), 6 (62%), 13 (65%), 14 (66%)	-	17 (75%)	9 (62%), 10 (63%), 11 (66%)
No, CB Exams	18 (88%)	4 (84%), 5 (70%), 12 (77%), 15 (77%), 16 (73%), 19 (81%)	1 (64%), 6 (65%), 8 (63%), 13 (68%), 14 (68%)	-	17 (71%)	7 (63%), 9 (66%), 10 (65%), 11 (66%)
Yes, CB Exams	4 (100%), 5 (100%), 12 (86%), 15 (86%)	13 (71%), 18 (76%), 19 (81%)	1 (62%), 2 (67%), 3 (57%), 6 (57%), 8 (67%), 9 (57%), 14 (62%), 16 (59%)	-	17 (75%)	-

Table – 6: Calculated Values of χ^2

Sr. No		Gender	Dept.	Desig.	Qualif.	Teach Exp.	Comp Certi.	CB Exp.
Level of Significance 95%		df = 2, χ^2= 5.99	df = 4, χ^2 = 9.49	df = 2, χ^2=5.99	df = 2, χ^2=5.99	df = 2, χ^2=5.99	df = 2, χ^2=5.99	df = 2, χ^2= 5.99
1.	χ^2	4.923	4.222	3.639	4.474	0.843	1.512	2.542
	Sig.	0.085	0.377	0.162	0.107	0.656	0.469	0.281
2.	χ^2	0.909	4.440	0.348	0.686	2.615	2.997	5.528
	Sig.	0.635	0.350	0.840	0.710	0.271	0.223	0.063
3.	χ^2	3.766	3.289	4.046	**7.867**	**7.282**	1.769	5.754
	Sig.	0.152	0.511	0.132	0.020	0.026	0.413	0.056
4.	χ^2	3.335	5.869	1.045	0.928	1.167	**8.401**	4.589
	Sig.	0.189	0.209	0.593	0.629	0.558	0.015	0.101
5.	χ^2	2.121	3.341	2.172	1.714	0.691	3.196	2.233
	Sig.	0.346	0.502	0.338	0.424	0.708	0.202	0.327
6.	χ^2	0.659	**10.502**	0.708	**8.651**	4.819	1.531	0.045
	Sig.	0.719	0.033	0.702	0.013	0.090	0.465	0.978
7.	χ^2	3.416	7.999	0.654	4.418	0.477	4.621	1.208
	Sig.	0.181	0.092	0.721	0.110	0.788	0.099	0.547
8.	χ^2	3.737	**13.729**	3.724	1.320	4.619	5.780	5.454
	Sig.	0.154	0.008	0.155	0.517	0.099	0.056	0.065
9.	χ^2	0.613	3.112	4.920	**6.883**	2.138	1.855	2.901
	Sig.	0.736	0.539	0.085	0.032	0.343	0.396	0.234
10.	χ^2	3.046	16.525	1.299	0.202	1.353	1.644	4.597
	Sig.	0.218	0.002	0.522	0.904	0.508	0.440	0.100
11.	χ^2	2.280	5.557	4.526	3.243	**8.319**	**10.391**	1.596
	Sig.	0.320	0.235	0.104	0.198	0.016	0.006	0.450
12.	χ^2	1.942	2.982	3.243	4.432	0.801	0.878	0.728
	Sig.	0.379	0.561	0.198	0.109	0.670	0.645	0.695
13.	χ^2	0.951	**11.287**	3.525	4.491	3.868	4.232	3.550
	Sig.	0.621	0.024	0.172	0.106	0.145	0.121	0.169
14.	χ^2	4.506	3.987	0.676	0.391	3.431	1.652	5.233
	Sig.	0.105	0.408	0.713	0.822	0.180	0.438	0.073
15.	χ^2	**11.698**	7.599	0.755	4.324	0.198	1.827	2.350
	Sig.	0.003	0.107	0.685	0.115	0.906	0.401	0.309
16.	χ^2	1.482	7.478	2.009	2.590	0.129	4.628	2.545
	Sig.	0.477	0.113	0.366	0.274	0.937	0.096	0.280
17.	χ^2	1.258	3.900	3.102	2.533	4.045	4.066	**6.684**
	Sig.	0.533	0.420	0.212	0.282	0.132	0.131	0.035
18.	χ^2	0.349	5.490	2.162	1.857	1.415	0.370	1.489
	Sig.	0.840	0.241	0.339	0.395	0.493	0.831	0.475
19.	χ^2	3.047	1.921	1.813	0.266	0.197	1.490	3.619
	Sig.	0.218	0.750	0.404	0.875	0.906	0.475	0.164
20.	χ^2	3.429	7.414	**8.132**	3.124	1.051	**6.388**	0.188
	Sig.	0.180	0.116	0.017	0.210	0.591	0.041	0.910
21.	χ^2	4.704	5.689	3.302	1.003	2.386	1.604	2.570
	Sig.	0.095	0.224	0.192	0.605	0.242	0.448	0.277