

Full Length Research Paper

Social sciences vs. pure sciences: gender-wise perceptions of students about computer-based examinations

^{1*}Mubashrah Jamil, ²Keith J. Topping and ²David Walker

^{*1}Bahauddin Zakariya University Multan, PK
²University of Dundee, Dundee, Glasgow, UK

Accepted 21 May, 2013

A survey based study was aimed to measure the gender-wise attitudinal differences among 1877 students of 8 different universities from pure and social science faculties, regarding online system of examinations. Therefore, a questionnaire based on 5-point rating scale was designed. This questionnaire was responded by 1877 students, out of which 1052 have already attempted papers online in different forms i.e. MS Certification, online GRE test, online IELTS and so on. An overwhelming majority (81% - 90%) of the sampled students expressed that online system of examinations are interesting because it improves their grades, results are unbiased, saves their time, supports to understand the national and international universities pattern of examinations and secure. Besides of these, a good majority (71% - 80%) of sampled students also expressed that computer systems may affect thinking potential during exam and online examinations overburden learning process; therefore, should be avoided. Overall female students and students from pure sciences disciplines were found to be more interested in online system of examinations. Significant attitudinal differences were found in the group of female students from Social Sciences and Pure Sciences.

Keywords: Pure sciences assessment, social science assessment, computer-based assessment, online examinations, university students.

INTRODUCTION

Assessment is a vital component of an educational setup which provides information about students' attainment, strengths and weaknesses (Al-Sabbah, Al-Sabbah, and Abod, 2011). It also reflect the efforts of both teachers and students to the extent they achieved educational standards. Guskey (2003) verified the same by adding that assessment process starts with planning based on the program of studies, learning outcomes involving assessment and evaluation criteria. Variety of assessment tools and strategies are being used by teachers to assess teaching, which are associated with instructional strategies actually used by teachers in the classrooms (Tierney, 2006) and sometimes with the nature and type of subjects. For example, teachers from arts and social sciences use observation, conversations, presentations, discussions, interviews and transcript

analysis techniques and pen-paper-pencil as examination tools. But assessment for the subjects of pure-sciences may also include some laboratory-based practical work along with other assessment tools and methods. This is important because performance-based tasks cannot be evaluated by using traditional paper-and pencil based tests (Lantz, 2004) or examinations, only.

Paper-pencil based examinations are the crucial tools and techniques of assessment at all levels of education and for all disciplines. But the inclusion of technology has made drastic changes in educational setup (Jamil and Shah, 2011). The online learning has become more pervasive; therefore, it is required from educators to consider modes of assessment using similar tools (Fluck, Pullen and Harper, 2009). According to Scheuermann and Bjornsson (2009) 'with increasing availability of information and communication technologies (ICT), new possibilities are provided to assess learning processes and outcomes which are more effective than, that was possible with traditional assessment/testing instruments'.

*Corresponding Author E-mail: mubashrahj@yahoo.com

Computer-based examinations – also known as online assessment, e-assessment, and computer assisted assessment (Jamil, Topping, Tariq, 2012) – is not a new idea and terms for the educationists of 21st century and are being investigated by the researchers in different dimensions. For example, Bull (1999) conducted a study to investigate the impact of computer assisted assessment on higher educational institutions; in the same directions McKenna (2001) identified the impacts of computer based assessment upon academic practices; Sim, Holifield and Brown (2004) discussed various issues regarding the implementation of computer assisted assessment and also different types of question formats for this method of assessment specifically; Conole and Warburton (2005) took a review of computer assisted assessment and successfully differentiate online assessment, computer-based assessment, and computer assisted assessment; many others conducted studies to understand the difference between paper-based vs. computer based testing, where Al-Amri (2008) is just one example who had compared these testing modes in his study. But researchers were failed to search any study which narrate the attitudinal differences regarding computer-based examinations among students or teachers from different disciplines of social sciences and pure sciences in a single study. Therefore, this study will contribute to bring the attention of researchers and scientists to understand the attitudinal differences between the two major disciplines in the system of education and then plan to invest for the computerized examination systems.

Computer assisted examination system has not yet been fully implanted (i.e., constructions, administration, marking and declaration) in any public or private sector universities in Pakistan. But the process of transformation from paper-based to computer-based has started. Teachers and students on the bases of their own interest have evolved technology in the process of assessment. Therefore, at this stage it was worth important to understand whether students from different disciplines believe that computer-based examinations are equally beneficial for them or not. This study explored the perceptions of students from different disciplines of pure and social sciences to recognize their opinion about computer-based examinations.

Research Questions

Following research questions were formulated to conclude the study:

Q1. What is the difference between the perceptions of male and female students about computer-based examinations?

Q2. Whether students from pure sciences disciplines were perceptually more positive towards computer-based examinations?

Following is a brief literature review for sharing key findings of some research studies regarding computer-based examinations. This section will focus to explore students' experiences about computer-based examinations from different disciplines of pure and social sciences.

Literature Review

Computer-Based Examinations: Social Sciences

English: Beverly, Beverly, Clarke and White (2001) found how computer-assisted assessment (CAA) helped them to assess their students in variety of ways by using different types of questions i.e., text matching questions, MRQs (multiple response questions), MCQs (multiple choice questions), fill in the blanks and hotspot. Total 55 students on the three modules for which there was a program of computer-based assessment was accessed 2521 times, an average of 45.84 per students. Students worked repeatedly to assess themselves until they achieved 80% scores. The average marks of summative assessment showed the improved performance of the students from the previous year i.e., 63.46 in year 2000 and 79.25 in 2001. The highest average students' response 41.80 showed that the CAA program helped them to learn vocabulary and grammar and as a specific means of practicing for the language test. While in contrast the average response for 10.90 represented few or no use of the program at all. The average response 47.30 showed that students agreed that CAA program improved their performance and in the contrast only 1.80 average students responded, that it was worst than usual. Average 87.30 students agreed to take a test in the same form again, but 9.10 average students did not.

Fine Arts: Thomas (2005) conducted a larger study to explore computer understanding and marking process of diagrams during an online examination by using simple tools or software. Critically this study yields impacts, advantages, limitations, validity, and implementation of CAA dealing with textual answers; but there was no provision for the creation or marking of diagrams. Marking diagrams online is concerned with a number of issues such as: features of drawing tool, students' familiarity before the exam with that tool, examination condition for using tool for students during exam, diagram presentations and transformation on net, grading of diagrams, and format of feedback to students for that diagram. Diagrams were limited to boxes and links. For example, box containing text as label or caption and arrows for linking it with other box as per the requirement of the question. Where boxes, caption, and links could be changed or removed during exam. The study was based on two different trials. The first trial was concerned about students' reaction to a prototype tool and its use in exam. Students were given an opportunity to use the tool before

exam but few of them took advantage from this opportunity. During exam, the use of tool was not mandatory so only few students used it. Those who didn't attempt this question thought that it would take too much time to complete but actually they had not practiced it before exam. Some minor changes were made before trial 2 to the tool as a result of this trial.

In the second trial 15 students submitted the examination 12 of whom attempted the drawing question that was compulsory and allocated 4% worth of the marks on the whole paper. Nine students answered the question successfully, 3 students tried to draw a diagram but not submitted and 3 didn't attempt the question. The main problems experienced by students were, a perceived lack of space to type in the boxes, and dislike of scrolling. Out of 15 students 6 responded that the tool was easy to use.

Computer-Based Examinations: Pure Sciences

Biology: Gemmitti (2003) conducted a study to evaluate computer-based practice quizzes and graded tests on the students of first year in the subject of biology. He concluded that all respondents were aware of the practice quizzes and grade tests and has already practiced them online. They recommended minor improvements to the computer-based system and increased use of the practice quizzes which would improve the performance grades.

Andrew (2006) conducted a study in which undergraduate students of pharmacy were required to undertake a four-week laboratory-based project. In the project they are asked to identify series of microscopically, cultural and biochemical experiments to identify unknown organism. After acquiring their data, they were expected to use an online bacterial identification program to deduce the identity of their unknown organism. Traditionally they were having 10 minutes to consult their tutor to verify any problematical results before presenting for assessment. By using an online program, Andrew found that it removed the need of consultation with tutor, reducing the marking load for tutors and assessment load for students. The online assessment process comprised of 3 stages. It was concluded by the author that all 149 students, which took part in the study submitted their data by deadline out of which 133 (89%) students got their identity correctly, 6(4%) got just the genus name correct and 10(7%) students failed to get their name correctly. Only one student failed to confirm to the convention on biological nomenclature erroneously using a capital letter for the species name. 83% student got higher grades i.e., 30 marks out of 40 which led to a conclusion that online assessment of the project had skewed performance towards an over-optimistic to assess student ability that is not possible by the tutors perception of the students'

laboratory skills during classes. And students' feedback questionnaire showed that they highly appreciated this method of learning and assessment.

Chemistry: According to Bertolo and Lambert (2007) Higher Education Academy played a vital role to introduce CAA in Chemistry at higher educational level. Authors explored that Adams et al., developed a series of online question banks, Price conducted a project aimed by using CAA to provide formative feedback to students in their first year of undergraduate chemistry subject, and Lowry used CAA for formative self-assessment, to provide chemistry support to Environmental Science Students. The purpose of their study was to use CAA for providing a closer connection between the assignment and the subsequent feedback, and facilitate students' engagement with the subject. Authors concluded that 93.7% students strongly agreed that the practice tests were useful to prepare for assessment, 87.5% agreed that practice test helped them to understand the concepts explained in the lecture, 70% students responded regarding CAA as compared to paper-based, 93.7% like doing CAA, and 78% of the students agreed that using computer as tool made them feel confident in their learning and 79% of the students were using computer for more than 5 years, so, they didn't get any problem during online assessment. Only one student preferred to do paper-based assignment. According to academic staff, it is time taking and difficult process to translate original paper assignment to computer based. Staff availability at the time of assessment may provide a more realistic approach to the online assessment. The only drawback of the study was that the questionnaire filled by most of those students who were quite interesting in the online assessment system and response rate was 38.5% of the total students.

Physics: according to Bacon (2003), CAA technique is being used for several years in the Physics department at university of Surrey, UK. SToMP (Software Teaching of Modular Physics) testing system was being utilized by the teachers since 1994. In the study the SToMP system was revised with some advanced techniques i.e., according to QTI standards. The basic objective for the study was to re-implement the paper-based course work by the electronic form that was acceptable for the students. This electronic based course work will automatically reduce teachers' workload for marking and students could get feedback at prompt in the form of marks and comments without increasing their workload. Students showed their positive attitude towards electronic course work survey conducted at the end of academic year 2003. Students' liked the prompt feedback and the ability to retry the question that helps them to improve their grades and marks. Electronic course work system offer multiple question tries with numerical expression analysis of the type described, with a learning environment able to provide supporting information in a structured way and having a communication system suitable for live-tutor

support.

Mathematics: Computer based assessment provided better opportunities for students to clear mathematical concepts by requesting additional distinct, but equivalent problems sets for practice (Naismith, 2004). Traditionally in paper-based exams, full marks were normally awarded for a correct answer and partially to those questions which were considered to correct in some steps in mathematics. This was verified by McGuire, et al (2003), who designed a study in which they compared the results of candidates taken on computer versus to those obtained by candidates sitting conventional examinations using pen and paper. He concluded that student get lower marks than as achieved in paper-based exam. This comparison also reflected that it was not very easy to convert paper-based exam in mathematics to computer-based assessment. Because longer and more sophisticated the problem was, the higher probability to achieve higher marks. Another problem was detected that if a student gave wrong answer in first step and the subsequently remaining steps are correct – computer will mark it zero, where as partial credit was normally awarded in paper-based examination system. Later, Foster (2007) established a computer based assessment system for the first year students of Mathematics and Stats. Foster found that students took more interest in online assessment and get higher marks than in previous years. Online assessment system also reduced teachers' workload and overall cost of paper marking.

METHODOLOGY

The current study was inspired by the studies of Bull (1999) and McKenna (2001). Bull and McKenna explored concepts, importance, advantages and limitations of computer assisted assessment on university teachers, students and administrators in depth. Although the purpose of this study was slightly different from the above quoted authors but the items of the tool for this study was developed in the light of their articles.

To explore the possible or actual differences among the perceptions of male and female students belonging to different social sciences and pure sciences disciplines in a limited range of universities, the researchers used a survey tool to solicit the responses from the targeted population. Therefore, the study was based on quantitative methods and hence, therefore, following methodology was adopted to conclude the research.

Sampling: Total 36 (20 Public Sector and 16 Private Sector) universities from Punjab Province were delimited for this study. It was felt that this province would give a representative sample as compared to other provinces, and it was convenient as the place in which the main researcher was located. Out of 20 Public Sector Universities, 8 (40%) were randomly selected for inclusion in the sample. Private Sector Universities were

dropped because of their limited number of students and the great variety of different disciplines they offered. The data was disaggregated by: sex and disciplines in social sciences and pure sciences. Therefore, all male and female students from all teaching departments of social sciences and pure sciences constitute population of this study. After the selection of the universities, departments of Education, Psychology and Economics from the faculties of Social Sciences and departments of Mathematics, Physics and Chemistry from the faculties of Pure Sciences disciplines were included in the study because of the main objective of the study. However, students of each department were chosen on the basis of their availability in offices and classes. Permission was sought from all of the head of the departments in each university before data collection. Questionnaires were distributed among the students available in their classes in the presence of their concerned teachers. In the response, 1877 (85%) questionnaires were filled by them and recollected successfully.

Questionnaire: The study was quantitative (see Table 1a); therefore, a questionnaire based on 5-point rating scale was developed to seek the required information. All items of the questionnaires were couched in relation to issues emerging in the literature review. The methodology and format of the questionnaires followed the studies of Barbra and Sylvia (1999) and Yavuz (2005). It also stemmed from literature such as Debuse, Lawley and Shibl (2008), Irving, Read, Hunt, and Knight (2000) and O'Hare (2001), who used a 5-point rating scale to measure students' attitude towards CAA in different studies conducted in different disciplines.

The questionnaire was comprised of two major parts. Part 1 was related to students' demographic information, which included gender, department and a question in which it was asked whether they have taken any computer-based examination. Part 2 comprised of 12 items, which was attempted, generally by all students, while Part 3 (Table 1.a) consisted of 17 items and was for only those students who have some experience of online assessment. In Part 2, generally simple items were included related to the topic, but in Part 3 items were included which were directly related to their online assessment experiences. Basic purpose for including Part 2 in the questionnaire was to control and maximize students' participation during questionnaire distribution within the classroom. Otherwise, they could easily skip from the classroom by saying "Sorry, we have no experience of online examination". Results of Part 2 dropped in the current study because of the length of the research paper.

To explore the issue of validity, the questionnaire was piloted in different disciplines of different universities. In pilot study 1, the questionnaires were administered to students of two departments (Education and Mathematics) of two different universities. Forty students including five males and five females from four

Table 1a. Part 3 of the Questionnaire

Sr. #	Statements	SA	A	?	D	SD
1.	Online examinations are interesting.					
2.	Online test/examinations always made me confused during.					
3.	Online examination can improve students' achievement.					
4.	A minimum level of knowledge and experience of using the computer is enough to attempt the test or examinations.					
5.	Online examination reduces test/exam anxiety.					
6.	Online examinations support to practice the foreign universities test or examinations available on internet.					
7.	I believe that computer based examinations are not possible to conduct in the universities of Pakistan.					
8.	Interactive exercises (i.e., available on net) helps us to improve the test/examination marks.					
9.	Computer based examinations may help us to maintain or improve our standard of examination at international level.					
10.	Computer based examinations are helpful to assess my-self.					
11.	Immediate feedback in online examination saves our time.					
12.	I always lose my confidence while solving the questions online.					
13.	I always prefer to take tests or exams online.					
14.	The results in online tests/exams are always unbiased.					
15.	Online tests/exams are much more secure than to traditional paper-pencil based examinations.					
16.	Online examinations overburden the students i.e., to take special training of computer handling to attempt the paper. So it should be avoided by the teachers in classroom tests.					
17.	Computer-based examinations damage thinking ability during test/exam time.					

departments completed the questionnaire. During administration of the questionnaire, any difficulty in understanding the terms, required space for answering the items and other questions raised by the students were recorded and then thoroughly discussed with a panel of experts. It was then decided to change the format by replacing some items, and include new items to make the questionnaire more self-explanatory. Due to the changes incorporated, it was then necessary to conduct a further pilot study. Departments of Psychology and Chemistry were included in pilot study 2. Again, sixty students were chosen with equal distribution across departments and of gender. Minor revisions were made as a result of the second pilot study. The final draft of the questionnaire was sent to the six different experts in the field of Education and Assessment for their opinion. These six experts were Head/Director of departments in different universities of Punjab and were acknowledged in the field of Assessment, Examinations and Computer Education.

Data Analysis: Percentages and Pearson Chi Square (χ^2) tests at $\alpha = 0.05$ were used to draw conclusions from the collected data. Results were interpreted on the basis of 'overwhelming majority (81% – 90%)', 'good majority

(71% - 80%) and 'simple majority (61% - 70%)'.

All positive statements of both questionnaires were weighted from +2 to -2 (Hirsch, Frank, Shapiro, Hazell and Frank, 2004; Desselle, 2005). Where +2 and +1 rated 'Strongly Agreed' and 'Agreed' respectively while -1 and -2 were used for 'Disagreed' and 'Strongly Disagreed' respectively for all positive statements. And '0' was meant by 'Unable to Decide'. All responses to the open ended questions were analyzed in terms of themes emerging, and the frequency of the most commonly emerging themes was indicated in the form of percentages.

RESULTS

There were 1055 (56%) female and 822 (44%) male, out of 1877, students participated in the study. Questions regarding the online examination experiences, it was found that 1052 (55%) students experienced online examinations. Out of 1052 students, 548 (52%) were female and 504 (48%) were male. Therefore, the actual results were formed from 1052 students, for the present study, based on their experiences of online examinations.

Table 1. Sampled Students' Distribution

Groups	F	%age
Overall Male	822	44%
Overall Female	1055	56%
Overall students with Online Examinations Experiences	1052	55%
Female students with Online Examinations	548	52%
Male students with Online Examinations	504	48%
Overall Social Sciences (SSc) Students	548	52%
Overall Pure Sciences (PSc) Students	504	48%
SSc Female	274	50%
SSc Male	274	50%
PSc Female	274	54%
PSc Male	230	46%

Table 2. Online Examinations are Interesting (statement 1)

Groups	A/SA	?	D/SD	χ^2 (df=2)
Male	433 (82%)	41 (08%)	57 (11%)	2.914*
Female	399 (83%)	25 (5%)	58 (12%)	
SSc	414 (80%)	30 (06%)	74 (14%)	9.517
PSc	418 (84%)	36 (07%)	41 (08%)	
Female (SSc)	209 (79%)	17 (06%)	38 (14%)	8.031
Female (PSc)	224 (84%)	24 (09%)	19 (07%)	
Male (SSc)	205 (81%)	13 (05%)	36 (14%)	2.327
Male (PSc)	194 (85%)	12 (5%)	22 (10%)	
SSc (Female)	209 (79%)	17 (06%)	38 (14%)	0.433
SSC (Male)	205 (81%)	13 (05%)	36 (14%)	
PSc (Female)	224 (84%)	24 (09%)	19 (07%)	3.321
PSc (Male)	194 (85%)	12 (5%)	22 (10%)	

*Tabulated value of $\chi^2=5.99$ at $\alpha = 0.05$

Moreover, see Table 1 showed gender-wise distribution of male and female students sampled from social sciences (SSc) and pure sciences (PSc) disciplines.

All of these 1052, attempted online examinations in different courses/papers/tests for example: Online Medical Entry Test, Online Aptitude Test, Online GRE Test, Online IELTS Test, MS Certification, and the all of those examinations in which computer applications were required to test online by the university teachers. Although the types of examinations were different but here in this study, the research was not concerned about the type of course/paper/test but was focused on their attitudinal differences regarding online examinations experiences only.

From (see Table 2), it was depicted that an overwhelming majority of all sampled students except female students from SSc disciplines believe that online examination systems were interesting technique of assessment to them. Comparatively, overall female students, overall students and group of male and female

students from PSc disciplines and group of male students showed more interested in online systems of examinations. Calculated values of χ^2 test were statistically significant between the groups of SSc and PSc students and female students of SSc and PSc.

(See Table 3) portrayed that good majority of all sampled students except male students from SSc discipline believed that online examinations can improve students' achievements. It was clear from the table that overall male students, overall students and group of male and female students from PSc disciplines, female students from the group of SSc and male students from the group of PSc positive attitude towards online examinations. Calculated values of χ^2 test showed that the attitudinal differences were statistically significant between the groups of SSc and PSc students and female students and male students from the same distribution.

Percentages of (see Table 4) showed mixed attitudinal differences ranged from overwhelming to good majorities of the sampled students. Overwhelming

Table 3. Online Examinations can Improve Students' Achievement (statement 3)

Groups	A/SA	?	D/SD	X ² (df=2)
Male	356 (74%)	51 (11%)	73 (15%)	1.841
Female	386 (73%)	69 (13%)	71 (14%)	
SSc	364 (70%)	53 (10%)	100 (19%)	22.914
PSc	378 (77%)	67 (14%)	44 (09%)	
Female (SSc)	185 (72%)	26 (10%)	47 (18%)	12.117
Female (PSc)	201 (75%)	43 (16%)	24 (09%)	
Male (SSc)	179 (69%)	27 (10%)	53 (21%)	12.173
Male (PSc)	177 (80%)	24 (11%)	20 (09%)	
SSc (Female)	185 (72%)	26 (10%)	47 (18%)	0.476
SSC (Male)	179 (69%)	27 (10%)	53 (21%)	
PSc (Female)	201 (75%)	43 (16%)	24 (09%)	2.784
PSc (Male)	177 (80%)	24 (11%)	20 (09%)	

Table 4. Online Examinations Supports to Practice Foreign Countries Universities Test/Examinations (statement 6)

Groups	A/SA	?	D/SD	X ² (df=2)
Male	369 (76%)	51 (11%)	66 (14%)	1.382
Female	419 (78%)	45 (08%)	71 (13%)	
SSc	379 (71%)	62 (12%)	91 (17%)	22.318
PSc	409 (84%)	34 (07%)	46 (09%)	
Female (SSc)	192 (71%)	34 (13%)	44 (16%)	18.705
Female (PSc)	227 (86%)	11 (04%)	27 (10%)	
Male (SSc)	187 (71%)	28 (11%)	47 (18%)	9.524
Male (PSc)	182 (81%)	23 (10%)	19 (09%)	
SSc (Female)	192 (71%)	34 (13%)	44 (16%)	0.625
SSC (Male)	187 (71%)	28 (11%)	47 (18%)	
PSc (Female)	227 (86%)	11 (04%)	27 (10%)	7.191
PSc (Male)	182 (81%)	23 (10%)	19 (09%)	

majority of overall students and group of male and female students from PSc disciplines agreed / strongly agreed with the statement that online examinations supports them to solve different national and international higher educational institutions' entry tests or other practicing tests. Calculated values of χ^2 test showed that the attitudinal differences were statistically significant between the groups of SSc and PSc students, male students and students from PSc disciplines.

See (Table 5) showed that good majorities of the sampled students from all groups except female students of PSc disciplines which lies in the category of overwhelming, were agreed /strongly agreed with the statement that online course related questions/quizzes/tests help them to improve their classroom tests / examination marks. Comparatively, overall female students, group of PSc students, male students of PSc and female students of SSc disciplines showed highly positive attitude than to overall male

students, overall SSc students, male SSc and male PSc respectively. Calculated values of χ^2 test showed that the attitudinal differences were statistically significant between the groups of overall male and female students, overall students from the disciplines of SSc and PSc, between the male students of SSc and PSc and between the male and female students of SSc disciplines.

Percentages of see (Table 6) represented that overwhelming majority of overall all groups of sampled students suggested that if we include online system of examinations at all levels of education, we would be able to improve the existing status of our examinations system. Calculated percentages also described that overall female student, group of PSc disciplines, SSc female students and PSc female students were significantly more inclined towards online system of examinations. Calculated values of χ^2 test showed that the attitudinal differences were statistically insignificant between all the sampled groups.

Table 5. Online Exercises helps us to Improve Marks (statement 8)

Groups	A/SA	?	D/SD	X ² (df=2)
Male	351 (71%)	52 (11%)	91 (18%)	11.273
Female	424 (80%)	33 (06%)	75 (14%)	
SSc	384 (72%)	53 (10%)	97 (18%)	8.269
PSc	391 (80%)	32 (07%)	69 (14%)	
Female (SSc)	207 (78%)	17 (06%)	42 (16%)	1.346
Female (PSc)	217 (82%)	16 (06%)	33 (12%)	
Male (SSc)	177 (66%)	36 (13%)	55 (21%)	8.173
Male (PSc)	174 (77%)	16 (07%)	36 (16%)	
SSc (Female)	207 (78%)	17 (06%)	42 (16%)	10.890
SSC (Male)	177 (66%)	36 (13%)	55 (21%)	
PSc (Female)	217 (82%)	16 (06%)	33 (12%)	1.618
PSc (Male)	174 (77%)	16 (07%)	36 (16%)	

Table 6. Online Examination Maintain/Improve Standards of Examinations (statement 9)

Groups	A/SA	?	D/SD	X ² (df=2)
Male	418 (85%)	21 (04%)	40 (08%)	3.499
Female	473 (89%)	21 (04%)	40 (08%)	
SSc	460 (86%)	17 (03%)	56 (11%)	4.797
PSc	431 (87%)	25 (05%)	37 (08%)	
Female (SSc)	235 (88%)	07 (03%)	25 (09%)	4.852
Female (PSc)	238 (89%)	14 (05%)	15 (06%)	
Male (SSc)	225 (85%)	10 (04%)	31 (12%)	0.779
Male (PSc)	193 (85%)	11 (05%)	22 (10%)	
SSc (Female)	235 (88%)	07 (03%)	25 (09%)	1.388
SSC (Male)	225 (85%)	10 (04%)	31 (12%)	
PSc (Female)	238 (89%)	14 (05%)	15 (06%)	2.994
PSc (Male)	193 (85%)	11 (05%)	22 (10%)	

Table 7. Online Examinations help me to Assess Myself (statement 10)

Groups	A/SA	?	D/SD	X ² (df=2)
Male	334 (69%)	91 (19%)	61 (13%)	7.729
Female	401 (75%)	67 (13%)	65 (12%)	
SSc	377 (71%)	82 (16%)	71 (13%)	1.103
PSc	358 (73%)	76 (16%)	55 (11%)	
Female (SSc)	197 (74%)	38 (14%)	33 (12%)	1.330
Female (PSc)	204 (77%)	29 (11%)	32 (12%)	
Male (SSc)	180 (69%)	44 (17%)	38 (15%)	2.858
Male (PSc)	154 (69%)	47 (21%)	23 (10%)	
SSc (Female)	197 (74%)	38 (14%)	33 (12%)	1.490
SSC (Male)	180 (69%)	44 (17%)	38 (15%)	
PSc (Female)	204 (77%)	29 (11%)	32 (12%)	9.347
PSc (Male)	154 (69%)	47 (21%)	23 (10%)	

Percentages of (see Table 7) represented that good majority of overall all groups of sampled students

expressed that online system of examinations help to assess themselves. Calculated percentages described

Table 8. Immediate Feedback in Online Examination saves our Time (statement 11)

Groups	A/SA	?	D/SD	χ^2 (df=2)
Male	398 (82%)	44 (09%)	46 (09%)	1.302
Female	441 (83%)	38 (07%)	54 (10%)	
SSc	439 (83%)	41 (08%)	52 (10%)	0.162
PSc	400 (82%)	41 (08%)	48 (10%)	
Female (SSc)	221 (83%)	17 (06%)	30 (11%)	1.073
Female (PSc)	220 (83%)	21 (08%)	24 (09%)	
Male (SSc)	218 (83%)	24 (09%)	22 (08%)	0.805
Male (PSc)	180 (80%)	20 (09%)	24 (11%)	
SSc (Female)	221 (83%)	17 (06%)	30 (11%)	2.416
SSC (Male)	218 (83%)	24 (09%)	22 (08%)	
PSc (Female)	220 (83%)	21 (08%)	24 (09%)	0.591
PSc (Male)	180 (80%)	20 (09%)	24 (11%)	

Table 9. In Online Tests/Exams, Results are always Unbiased (statement 14)

Groups	A/SA	?	D/SD	χ^2 (df=2)
Male	441 (89%)	05 (01%)	51 (10%)	0.267
Female	489 (90%)	05 (01%)	51 (09%)	
SSc	489 (90%)	04 (01%)	49 (09%)	1.344
PSc	441 (88%)	06 (01%)	53 (11%)	
Female (SSc)	251 (92%)	01 (-)	22 (08%)	3.090
Female (PSc)	238 (88%)	04 (02%)	29 (11%)	
Male (SSc)	238 (89%)	03 (01%)	27 (10%)	0.094
Male (PSc)	203 (87%)	02 (01%)	24 (11%)	
SSc (Female)	251 (92%)	01 (-)	22 (08%)	1.790
SSC (Male)	238 (89%)	03 (01%)	27 (10%)	
PSc (Female)	238 (88%)	04 (02%)	29 (11%)	0.391
PSc (Male)	203 (87%)	02 (01%)	24 (11%)	

that overall female student and female of PSc disciplines were significantly more inclined towards online system of examinations. Calculated values of χ^2 test showed that the attitudinal differences were statistically significant between the groups of overall male and female students and between the male and female students of PSc disciplines.

Table 8 described that overwhelming majority of overall all sampled students from all groups expressed that immediate feedback in online examinations saves their time. Overall female students, overall students from SSc disciplines, male of SSc, and female of PSc were comparatively more disposed in their relevant groups. Not a single value of χ^2 test was found to be the significant.

Table 9 described that overwhelming majority of the sampled students strongly believed that results in online examinations are always unbiased. Comparatively high percentages in the groups showed that overall female students, overall SSc students, SSc female and male,

and PSc female students were strengthening the results positively. Difference between the percentages and frequencies were very low therefore, not a single value of χ^2 test was found to be the significant.

Again, Table 10 showed that overwhelming majority of the sampled students in all groups agreed / strongly agreed with the given statement i.e., online system of examinations were more secure to them than to the traditional system of examinations. Table also described that very few or no results lied in the column of '?' (i.e., unable to decide) which means they were able to differentiate between the two systems of examinations with confidence. Because the difference between the percentages and frequencies were very low therefore, not a single value of χ^2 test was found to be the significant.

Good majority of sampled students responded in the favor of the given statement in Tables 11. Few or no responses were found in the column of '?' (Unable to decide). Calculated values of χ^2 test were found to be

Table 10. Online Tests/Exams are Secure than to Traditional System of Examinations (statement 15)

s	A/SA	?	D/SD	$\chi^2(df=2)$
Male	433 (87%)	01 (-)	64 (13%)	1.659
Female	475 (87%)	04 (01%)	66 (12%)	0.928
SSc	469 (86%)	02 (-)	72 (14%)	5.117
PSc	439 (88%)	03 (-)	58 (12%)	1.743
Female (SSc)	232 (85%)	01 (-)	41 (15%)	1.396
Female (PSc)	243 (90%)	03 (-)	25 (09%)	5.647
Male (SSc)	237 (88%)	01 (-)	31 (12%)	
Male (PSc)	196 (86%)	-	33 (14%)	
SSc (Female)	232 (85%)	01 (-)	41 (15%)	
SSC (Male)	237 (88%)	01 (-)	31 (12%)	
PSc (Female)	243 (90%)	03 (-)	25 (09%)	
PSc (Male)	196 (86%)	-	33 (14%)	

Table 11. Online Tests/Exams Overburden Learning, therefore, it should be Avoided (statement 16)

Groups	A/SA	?	D/SD	$\chi^2(df=2)$
Male	380 (76%)	1 (-)	176 (24%)	1.684
Female	434 (80%)	1 (-)	110 (20%)	5.211
SSc	439 (81%)	1 (-)	103 (19%)	4.233
PSc	375 (75%)	1 (-)	124 (25%)	3.116
Female (SSc)	227 (83%)	-	47 (17%)	2.253
Female (PSc)	207 (76%)	1 (-)	63 (23%)	1.571
Male (SSc)	212 (79%)	1 (-)	56 (21%)	
Male (PSc)	168 (73%)	-	61 (27%)	
SSc (Female)	227 (83%)	-	47 (17%)	
SSC (Male)	212 (79%)	1 (-)	56 (21%)	
PSc (Female)	207 (76%)	1 (-)	63 (23%)	
PSc (Male)	168 (73%)	-	61 (27%)	

Table 12. Computer Systems affects Negatively on thinking Potential during Exam (statement 17)

Groups	A/SA	?	D/SD	$\chi^2(df=2)$
Male	398 (80%)	-	100 (20%)	3.878
Female	414 (76%)	02 (-)	129 (24%)	5.709
SSc	411 (76%)	-	132 (24%)	8.804
PSc	401 (80%)	02 (-)	97 (19%)	0.000
Female (SSc)	196 (72%)	-	78 (23%)	5.196
Female (PSc)	218 (80%)	02 (-)	51 (19%)	1.797
Male (SSc)	215 (80%)	-	54 (20%)	
Male (PSc)	183 (80%)	-	46 (20%)	
SSc (Female)	196 (72%)	-	78 (23%)	
SSC (Male)	215 (80%)	-	54 (20%)	
PSc (Female)	218 (80%)	02 (-)	51 (19%)	
PSc (Male)	183 (80%)	-	46 (20%)	

insignificant for all the sampled groups due to the limited differences of frequencies between them.

In Table 12, good majority of sampled students

strongly believed that efficiency of computer systems affect negatively on thinking potential during examinations. Calculated values of χ^2 test were found to

be significant for only one group i.e., female from SSc and PSc disciplines. One of the values of χ^2 test was found to be 0.000 because of the zero (00) difference between the observed frequencies and the calculated percentages.

DISCUSSION AND CONCLUSION

Purpose of this study was to measure the attitudinal differences of male and female students from different disciplines of pure sciences and social sciences regarding online examinations systems. A questionnaire, based on 5-point rating scale was composed to collect the required material. Total sample of 1877 students from eight different public sector universities of Punjab province took part in the study. Out of 1877, it was found that 1052 students have already experienced online examinations in different national and international examinations/entry tests or certifications. Therefore, all the analysis and results were concluded from the responses of those students which have experienced new system of examinations.

From the results it was found that there was a measurable difference between the genders over their attitude toward online examinations. Regarding the research questions, it was disclosed that overall female students, overall students from PSc disciplines and female students from PSc disciplines were more interested in online system of examinations than to male students or students from the group of SSc. They affixed that online system of examinations are interesting because online interactive course related exercises help them to clear their understanding with their subjects which in the result improves their grades in the institutional examinations. They also disclosed that online examinations were helpful to assess themselves and also support to download and understand foreign countries universities examinations patterns and criteria. They strongly believe that online examinations were more secure in terms of copying from others and also their results are always unbiased. Immediate feedback was another positive aspect of online examinations which save their time that is not possible in traditional system of examinations. Besides of its positive aspects, students expressed that computer systems working efficiency is one of the factors that could affect the thinking potential during examination. Moreover, basic computer handling training is required to attempt the paper online which overburden the learning; therefore, they suggest their teachers to avoid it as a permanent method of assessment.

From the data, it was found that majority of the students who have experienced online system of examinations were belonging to pure sciences disciplines and they have vast chances to appear and attempt online tests/examinations i.e. online entry tests of medical

colleges, MS Certification by the students of IT and so on. Therefore, their observations were more concrete and responses were based on real experience which helped the researcher to conclude the research. Moreover, it is suggested that an experimental study on the same topic may help to verify the results easily.

The study was delimited to 8 sampled universities of Punjab Province only; and only a questionnaire was used as a research tool to collect the required data. It is strongly recommended for future researches that other provinces should also be included in the study so that attitudinal differences could be measured at broader level; because implementations of online system of examinations is under process at all the higher educational institutions of Pakistan, therefore, an initial survey should be conducted to assess the existing resources and practices of new system of examination before the next study in this area; moreover, experimental studies could be more useful for the researchers to draw a conclusion regarding the attitudinal differences of students from different disciplines of pure sciences and social sciences.

REFERENCES

- Al-Amri S (2008). Computer-based testing vs. Paper-based testing: a comprehensive approach to examining the comparability of testing modes. *Essex Graduate Student Papers in Language and Linguistics*, 10:22–44.
- Al-Sabbah S, Al-Sabbah S, Abod F (2011). The Implications of Multiple Intelligences Theory and MIDAS Scale for Educators and Students in Jordanian Schools. *Int.J. Innovation, Manage. Technol.* 2(2):136-140.
- Andrew, M. (2006). Online Assessment of Laboratory Coursework in Microbiology: A Case Study. Proceedings of the 10th International Computer Assisted Assessment Conference, Loughborough. Retrieved from http://www.caaconference.com/pastConferences/2006/proceedings/Andrew_M_o1.pdf
- Bacon, R. (2003). Assessing the use of a New QTI Assessment Tool within Physics. Retrieved from <http://www.caaconference.com/pastConferences/2003/proceedings/bacon.pdf>
- Barbra D, Sylvia B (1999). Assessing the Impact of Technology on Teaching and Learning: Student Perspectives. *Proceedings of Mid-South Instructional Technology Conference*. Retrieved from <http://www.mtsu.edu/~itconf/proceed99/brace.html>
- Bertolo E, Lambert G (2007). Implementing CAA in Chemistry: A Case Study, Proceedings of the 9th International Computer Assisted Assessment Conference, Loughborough. Retrieved from <http://www.caaconference.com/pastConferences/2007/proceedings/Bertolo>
- Beverly J, Beverly E, Clarke M, White S. W (2001). Changing Perceptions in Language Learning and Testing. Proceedings of the 3rd International Computer Assisted Assessment Conference, Loughborough. Retrieved from <http://www.caaconference.com/pastConferences/2001/proceedings/I2.pdf>
- Bull J (1999). Computer Assisted Assessment: Impact on Higher Education Institutions. *Educational Technology and Society*, 2(3):123–126.
- Conole G, Warburton B (2005). A review of computer assisted assessment. *ALT-J, Research in Learning Technology*, 13(1):17–31.
- Debusse JCW, Lawley M, Shibl R (2008). Educators' Perceptions of

- Automated Feedback Systems. *AJET*, 24(4):374-386.
- Desselle SP (2005). Construction, Implementation and Analysis of Summated Rating Attitude Scales. *American Journal of Pharmaceutical Education*, 69(5):9.
- Fluck A, Pullen D, Harper C (2009). Case Study of a Computer Based Examination System. *Aust. J. Educ. Technol.* 25(4):509–523.
- Foster B (2007). Using Computer Based Assessment in First Year Mathematics Degree Courses at Newcastle University. *MSOR Connections*, 7(3):41–45.
- Gemmiti F (2003). Did Human Biology Students Use, Recommend and Benefits from Computer-Based Assessment? Retrieved from <http://www.herdsa.org.au/wp-content/uploads/conference/2003/PDF/HERDSA26.pdf>
- Guskey TR (2003). How Classroom Assessments Improve Learning? *Using Data to Improve Student Achievement*, 60(5):6–11.
- Hirsch S, Frank TL, Shapiro JL, Hazell ML, Frank PI (2004). Development of a questionnaire weighted scoring system to target diagnostic examinations for asthma in adults: a modeling study. Open Access Article. doi: 10.1186/1471-2296/5/30.
- Irving A, Read M, Hunt A, Knight S (2000). Use of Information Technology in Exam Revise. Proceedings of the 2nd International Computer Assisted Assessment Conference, Loughborough. Retrieved from <http://www.caaconference/proceedings/2002/>
- Jamil M, Shah JH (2011). Technology: Its Potential Effects on Teaching in Higher Education. *New Horizons in Education*, 59(1):38–51.
- Jamil M, Topping KJ, Tariq RH (2012). Perceptions of University Students regarding Computer Assisted Assessment. *TOJET*, 11(3):267–277.
- Lantz H.B Jr (2004). Rubrics for Assessing Student Achievement in Science Grades K – 12. Retrieved from http://www.sagepub.com/upm-data/6886_lantz_ch_1.pdf
- Martin R (2009). Utilizing the Potential of Computer-Delivered Surveys in Assessing Scientific Literacy. By Scheuermann, F, and Bjornsson, J. (Eds.). *The Transition to Computer-Based Assessment: New Approaches to Skills Assessment and Implications for Large-Scale Testing*. Retrieved from <http://www.jrc.ec.europa.eu/>
- McGuire GR, Youngson MA, Korabinski AA, McMillan D (2003). Partial Credit in Mathematics Exam – A Comparison of Traditional and CAA Exam. <http://www.caaconference.com/pastConferences/2003/proceedings/>, Dated: 07-09-2009
- McKenna C (2001). Introducing computers into the assessment process: what is the impact upon academic practice? Retrieved from <http://leeds.ac.uk/educol/documents/00001805.html>
- Muwanga-Zake JWF (2006). Applications of computer-aided assessment in the diagnosis of science learning and teaching. *Int. J. Educ. Dev. using ICT [Online]*, 2(4). Retrieved from <http://ijedict.dec.uwi.edu/viewarticle.php?id=226>.
- Naismith L (2004). Computer Algebra Based Assessment of Mathematics Online. Retrieved from <http://web.mat.bham.ac.uk>
- O'Hare D (2001). Students views of Formative and Summative CAA. Proceedings of the 2nd International Computer Assisted Assessment Conference, Loughborough. Retrieved from <http://www.caaconference/proceedings/2001/>
- Scheuermann F, Bjornsson J (Eds.) (2009). *The Transition to Computer-Based Assessment: New Approaches to Skills Assessment and Implications for Large-Scale Testing*. Retrieved from <http://www.jrc.ec.europa.eu/>
- Sim G, Holfield P, Brown M (2004). Implementation of computer assisted assessment: Lessons from the literature. *ALT-J, Research in Learning Technology*, 12(3). DOI: 10.1080/0968776042000259546
- Thomas, P (2005). Drawing Diagrams in an Online Examination. Proceedings of the 7th International Computer Assisted Assessment Conference, Loughborough. Retrieved from <http://www.caaconference.com/pastConferences/2005/proceedings/>
- Tierney RD (2006). Changing Practices: Influences on Classroom Assessment. *Assessment in Education*, 13(3):239 – 264.
- Yavuz, S. (2005). Developing a Technology Attitude Scale for Pre-Service Chemistry Teachers. *The Turkish Online Journal of Educational Technology – TOJET*, 4(1), Article, 2.