Online Assessment: A Pre-Launching Survey About On Screen Marking by National Examining Body at Secondary Level in Pakistan

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Original Article

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Abstract

The reliability of marking is directly linked with a degree of consistency of the examiner to carry out a fair, accurate and logical assessment. The examining bodies like boards and universities of Pakistan are trying to revamp reliable assessment process. In the digital era, on- screen marking facilitates many advantages as compared to traditional marking method, but there is need to learn the effect of assessment in the domain of new medium and marker attitude on screen and on paper marking. In this paper a Pre-Launching Survey about On Screen Marking by National Examining Body at Secondary Level in Pakistan was conducted. The objective of this study was to find the perception of examiners about on-screen marking. An online survey was conducted in which 176 science teachers provided their opinion. The findings revealed that a great difference appeared for computer proficiency w.r.t province, profession, teaching level, subject and locality. Participants believed that on-screen marking caused fatigue for eyes. Participants also did not prefer on-screen marking as they thought that a lot of training is required. Most of the participants did not have experience of on-screen marking. Participants believed that on-screen marking caused fatigue for eyes. Participants also did not prefer onscreen marking as they thought that a lot of training is required. It is concluded that participants find it hard to make the transition from paper-based marking to online marking with exam timelines to contend with. In the absence of proper training sessions, examiners would not be able to understand the rubrics and application of on-screen assessment.

Keywords: Evaluator's Attitude, computer proficiency, on-screen marking, reliability, training

Introduction

Over the past few decades, technology in educational environment has undergone a significant transformation. With the rapid growth of technology, standardized tests, curricula, and the teaching learning best practices all need to change as per digital era environment. Traditional ways of data collection have been rapidly changing due to emerging technologies like cloud computing, artificial intelligence, and variety of digital devices, which are providing a reliable innovative tool in educational settings. The development of technology has substantial potential effects on student learning outcomes through the creation and adoption of technological tools in assessment and evaluation. In different parts of the world, technology is being used for assessment purposes. The electronic educational tools support assessment and evaluation of student learning outcomes and can offer a wide range of alternatives to the traditional examination for student standardized testing (Shavkatovna & Anvarovich, 2022). COVID-19 has impacted lifestyles, marketing, consultation, teaching and learning, etc. During the COVID-19 pandemic, several pedagogical aspects including assessment

emerged to enhance quality education (An & Chen, 2022). On screen marking has added value to the conduct of examinations and markers' experience, while the precision of marking is maintained to ensure fairness and integrity of the national examinations. Fair and accurate assessment of students' procedures should be transparent to the public, because on-screen marking system, which is based on conventional cloud platforms, has been extensively employed in numerous large scale public examinations in recent years as compared to opaque and hidden traditional examination systems. In order to satisfy the needs of the students in this digital age, technology is enabling teachers to adopt cutting-edge ways in assessment (Choudhary & Javed, 2021). Complex apps are currently in a spectacular position in the learning process through technology, which offers opportunities in real time. Global digital educational environments are utilizing effective technological systems like learner or student response system (Song, et al., 2017), classroom response system (Kortemeyes, 2016), personal response system (Wang, 2015), audience response system and clickers (Fuller & Dawson, 2017). Contrary, it was found that there is no valid proof that a learner response system can enhance student's academic performance, and there is no evidence that technologies, which are incorporating gaming elements, are helpful. There is a remarkable research gap in addressing the various aspects and implications of OSM implementation. One of the most significant areas that requires further investigation is the impact of OSM on assessment reliability and validity, particularly in diverse educational settings. Limited empirical evidence found regarding the effectiveness of OSM in maintaining the fairness and consistency of grading across various disciplines and educational levels. Furthermore, there is a dearth of research exploring the influence of technological factors, such as the design of marking interfaces and the use of automated feedback tools, on markers' efficiency and accuracy. Closing this research gap is essential for informing best practices in OSM implementation, ensuring its appropriateness across different educational contexts, and advancing our understanding of its broader implications for assessment quality. But it can only be assured with the adoption of technology. However, the pace of adoption of technology is different across the globe. Therefore, the need for more thorough investigations employing causal designs is crucial. In the meanwhile, there should not be a hurry go to adopt technology with the intention of raising academic achievement (Gorard et al. 2022). In Pakistan, on screen marking is being launched in different board exams. There is no research found regarding on screen marking in Pakistan. This study was designed to explore the perception of teachers regarding onscreen marking so that the stakeholder can benefit from the findings of the study.

Literature Review

In the digital era, technologies have been used in every field of life. For assessment purposes, on screen marking has been used in many countries of the world. In the United UK the OSM technology was first used by Pearson Edexcel in 2003 and by 2013 two thirds of examinations were marked onscreen (DRS, 2014; Ofqual, 2013; Haggie, 2008). The HKEAA first marked all the English Language and Chinese Language scripts onscreen in 2007. In Zimbabwe, OSM was first piloted in 2010. In Singapore, on screen marking (OSM) in Singapore was started in 2015. Similarly, other countries have also adopted on screen marking for the assessment purposes as it has many advantages as compared to traditional marking method, but there is need to learn the effect of assessment in the domain of new medium and evaluator's attitude for on screen and on paper marking (Shaw, 2008). It is found that persistent concentration of readers regarding is higher during paper reading as compared to on-screen reading. Moreover, reading behavior in printed text is high in terms of understanding, confidence, and involvement as compared to on-screen reading digital tools (like smartphones, tablets, laptops, computers etc. are pervasive in present digital era) among children and youth (Mullis et al., 2017). In recent years, screen technologies like electroluminescent display

ELD, liquid crystal display LCD, thin-film transistor TFT, light –emitting diode LED, plasma display PDP etc. have replaced paper stuff in our daily lives. The literature provides mixed findings regarding paper based reading and on-screen digital mode reading. According to Aydemir, Öztürk, & Horzum (2013) comprehension of passage is easy on-screen as compared to paper-based materials, whereas Rockinson-Szapkiw et al. (2013); Porion et al. (2016) have argued that there is no difference between both media. However, Halamish & Elbaz (2019); Golan et al. (2018); Singer & Alexander (2017) have found merits of paper reading. At the same time health risks are also associated with excessive use of on-screen digital devices (Ahmed, Mehmood & Javed, 2021).

Research shows that for short answer scripts, the marking of examiners is considered reliable as compared to paper-based marking (Whetton & Newton, 2002; Shaw, 2008). However, for extended response questions, the reliability of on paper-based marking seems to be more reliable as compared to OSM due to lack of computer familiarity of evaluators (Twing, et al., 2003). Ofqual (2014), also revealed that many of the board examinations which use the OSM technology, grade the scripts at item level. He further elaborated that OSM is used for shorter and more restricted questions. Ofqual (2014) stated that the trend to use OSM is high for objective subjects such as science and mathematics are more likely to be marked on-screen than the subjective subjects such as English, drama and history. The more subjective questions which elicit longer answers seem to present challenges to the implementation of the OSM The monotony between paper based and on-screen assessment is not possible to obtain, however, with the rapid growth of technological on-screen tools is now considered as innovative and sophisticated tools which create positive attitude towards technology (Noyes & Garland, 2008).

Positive conclusions were made towards onscreen marking that provide the foundation in shifting from paper-based marking to onscreen marking in Hong Kong. It was also found that markers have the technological capability to implement onscreen marking in the examination system. Although evaluators are not satisfied to visit paper-based marking centers, but still paper-based marking has its own place towards quality (Coniam & Yeung, 2010) while onscreen marking is reliable as compared to paper-based marking in Hong Kong examination system (Coniam, 2010).

Examining bodies like universities, professional boards and technical boards may benefit from onscreen marking due to its following trump card functions:

a. To enhance the reliability of the assessment procedure.
b. To utilize more logical skills of the examiners in real time situations.
c. To promote digitalization in this digital era.
d. To increase the pace of marking.
e. To reduce the cost towards transportation.
f. Quality of education under real time monitoring process.
g. Error free tabulation of marks.
h. Easy compliance.
i. Secure storage mechanism.

On screen marking can increase monitoring and examiner's reliability during the evaluation process. OSM enables us to diagnose marking problems at a very early stage. OSM is also helpful to increase the quality of assessment. Harding & Raikes (2002) also found an enhanced quality assurance due to on screen marking. It is also helpful to record the scores of every student which can give indication about the coverage of syllabus. Yang, et al. (2018) has endorsed it that with the utilization of technology in onscreen marking system quality control can be enhanced. It was also found that factors like representation of markers, specified test, operation, rating scales and medium for onscreen

marking are considered reliable as compared to paper based mechanism of assessment due to global implementation of onscreen marking technology.

On screen marking is being used in different disciplines around the world. Beavis, et al. (2012) found that nursing staff considered online assessment as positive and nursing students welcomed the use of ICT for online assessment. In the engineering discipline, Sitthiworachart et al. (2008) found that the web-based automatic assessment system can substantially activate students, facilitate increased flexibility in the practical arrangements of teaching, and helps innovative practices such as grading student's works and diagnostic testing. However, in the assessment of languages, Johnson et al. (2010) found that no shifts in the location of the standard of recognized attainment across modes did not affect evaluator's reliability. Swart (2013) revealed that for distance learning institutes, on screen marking is very effective and time and cost consuming. However, there are also very many challenges associated with it such as resistance to change to the new marking system, installation of the software, user friendliness routers, Internet accessibility by students, staff training and restrictions of and bandwidth. Liu and Liu (2023) compare the rater's scoring for assessing writing performance across three modes i.e paper-based, on-screen marking of scanned images, and online word-processed versions and found that the difficulty level was ranked in ascending order of on-screen marking of scanned images, paper-based text, and online word-processed text. For science subjects such as assessment of Physics assignments, Freake (2008) found that Tablet PCs provide a valuable and acceptable method of marking physics assignments electronically. Students also gave a positive attitude for this method as it provides quick improvement and the ability to submit write up to the cut off time.

Objectives

The study was framed out to achieve the following objectives:

1. To find out the perception of teachers about onscreen marking.
2. To identify the self-perception of the participants about their computer proficiency.
3. To find the previous marking experience of the participants.
4. To explore the expectations of the participants from the on-screen marking.

Research Questions

To achieve the above-mentioned objectives, the following research questions were framed out.

1. What are the perceptions of teachers about onscreen marking?
2. How do the participants rate their computer proficiency?
3. What was the previous marking experience of the participants?
4. What are the expectations of the participants from the on-screen marking?

Methodology

For the present study, descriptive research design was adopted, and survey method was used to collect the data. Only those participants were randomly selected for data collection who obtained training for on screen marking. The sample consisted of 176 participants. The data was collected prior to formal on screen marking. In the present study, examiner's attitude towards on screen marking was explored using the tool developed by David Coniam (2009). This tool was adapted as per the objectives of the present study. Statements were developed on a 6-point Likert scale, where score "1" indicates an agreement or a positive response, whereas the score "6" shows a disagreement or a negative response. There were five sections of the questionnaire. Section 1 was about demographic information. In section 2, perceptions regarding Screen Marking were sought. This section was based on Likert scale with five-point rating from strongly agree to disagree. In section 3, Computer

Proficiency was sought of the participants. This section was based on a 6-point rating. Section 4 was about the Previous Marking Experience of the participants. This section was based upon a rating scale from 1-10 in one question and from 1-6 in the other questions. In section 5, the expectations of the Onscreen Marking (OSM) were sought from the respondents. There were different rating scales depending upon the nature of the items in this section.

Table 1. *Detail of sections of the questionnaire*

Section#	Title of section	No. of items
1	Demographic	8
2	Perceptions regarding on Screen Marking	8
3	Computer Proficiency	6
4	Previous Marking Experience	7
5	Expectations of the Onscreen Marking (OSM)	12

The questionnaire consisted of five sections. In section 1, the demographic information such as qualification, province, gender, profession, and subject, level of teaching/nonteaching / administration and area from the respondents was obtained.

Data Analysis

Data was collected through online questionnaire. The questionnaire was circulated among those participants who got training for the on-screen marking. Descriptive statistics were used to analyze the data. Percentage Mean and standard deviation was used for the data analysis.

Section-1 Demographic Information

Table 2. *Qualification level of respondents*

Qualification Level	Frequency	Percent
Graduation	24	13.6
Masters	116	65.9
M.Phil.	30	17.0
Ph.D.	6	3.4
Total	176	100.0

Table 2 shows that *66 %* respondents had master's degree whereas 17% had M.Phil. degree while only 2% had the highest degree of PhD.

Table 3. *Province wise detail of respondents*

Provinces	Frequency	Percent
Punjab	116	65.9
Sindh	18	10.2
KPK	4	2.3
Gilgit Baltistan	2	1.1
AJK	2	1.1
Islamabad Capital Territory	28	15.9
Baluchistan	6	3.4
Total	176	100.0

Table 3 shows that 66% respondents were from Punjab, 10% from Sindh, 2% from KPK, 1% from Gilgit Baltistan, 1% from AJK, 16% from ICT, and 3% from Baluchistan.

Table 4. *Gender wise detail of respondents*

Gender	Frequency	Percent
Male	122	69.3
Female	54	30.7
Total	176	100.0

Table 4 shows the gender wise detail of respondents. It shows that they were 69% male whereas there were 31% female Participated in this study.

Table 5. *Profession wise detail of Participants*

Profession	Frequency	Percent
Teaching	162	92.0
Administrative	14	8.0
Total	176	100.0

Table 5 shows that in this study there were 92% respondents from teaching profession whereas 8% respondents were from administrative side.

Table 6. *Subject wise detail of Participants*

Subject	Frequency	Percent
Physics	30	17.0
Chemistry	28	15.9
Biology	32	18.2
Mathematics	60	34.1
Computer Science	26	14.8
Total	176	100.0

Table 6 shows that 17% of physics teachers, 16% Chemistry teachers, 18% biology teachers, 34% of mathematics teachers, and 15% computer science teachers participated for this study.

Table 7. *Teaching Level of Participants*

Teaching Level	Frequency	Percent
Elementary Level	16	9.1
Secondary Level	130	73.9
Higher Secondary Level	30	17.0
Total	176	100.0

Table 7 that 9% teachers were teaching at elementary level, 74% teachers were teaching at secondary level whereas 17% respondents were teaching at higher secondary level.

Table 8. *Locality wise detail of Participants*

Locality	Frequency	Percent
Urban	154	87.5
Rural	22	12.5
Total	176	100.0

Table 8 shows that 88% of respondents were from urban areas whereas 30% respondents were from rural areas.

Table 9. *Teaching Experience of Participants*

Teaching Experience	Frequency	Percent
1-10 Years	50	28.4
11-20 Years	72	40.9
21- 30 Years	52	29.5
More than 30 Years	2	1.1
Total	176	100.0

Table 9 shows that 29% respondents had 1–10-year experience, 41% respondents had 11-20 years' experience, 30% had 21–30-year experience whereas, only 1% had head more than 30 years' experience.

Table 10. *Previous Onscreen Marking Experience*

Response	Frequency	Percent
No	138	78.4
Yes	38	21.6
Total	176	100.0

Table 10 shows that 79% of respondents did not have on-screen marking experience whereas 22% had on-screen marking experience.

Section 2 Perceptions regarding On Screen Marking

Section 2 deals with the perception of respondents about on-screen marking.

Table 11. *Perceptions regarding On Screen Marking*

Statements	N		Mean
	Valid	Missing	
On screen marking will be effective for speedy results	174	2	4.1839
On screen marking will provide less Administrative Time.	174	2	4.0345
On Screen marking will provide to maintain consistent and high-quality marking.	174	2	3.6897
On screen marking will be beneficial to reduce the number of scripts being sent back for review.	174	2	3.8621
On screen marking will enable examining bodies towards monitoring	174	2	3.8276
Easy assessment systems through On-Screen Marking	176	0	2.9545
The benefits of on-screen marking are numerous, but it can hard to make the transition from paper-based marking to online marking with exam timelines to contend with.	174	2	3.6552
Is it a right decision of on screen marking at present educational quality in Pakistan?	174	2	3.598

Table 11shows that overall, all the respondents had a positive attitude towards on screen marking.

Section 3 Computer Proficiency

Section 3 deals with computer proficiency of the respondents. In this section, Low mean scores of computer proficiency has been displayed. As per the scoring of rating scale, the scores 1-3 were considered as positive. In this section, the respondents provided positive feedback for all the statements.

Table 12. *Low (positive) mean score of Computer Proficiency*

Statements	N	Mean	Std. Deviation
Rate your computer proficiency	176	2.7045	1.43554
How good are you at manipulating the mouse?	176	2.5909	1.56122
Your command at enlarging the screen image	176	2.6705	1.60515
How good are you at scrolling the screen?	176	2.4773	1.57100
How comfortable are you reading off the screen?	176	2.7045	1.56504
How much do you use computers and technology in the teaching learning process?	176	2.9205	1.36253

Table 12 shows the low mean scores of computer proficiency. As mentioned above, the low mean score reflects the positive responses regarding computer proficiency. Nearly all the respondents had good computer proficiency.

Table 13. *Significant Differences*

Statements	Variable	Significance
Rate your computer proficiency	Province	(6,169)=3.917, p=0.001
	Teaching Level	(2,173)=9.388, p=0.000
	Locality	(174)=2.834, p=0.05
How good are you at manipulating the mouse?	Province	(6,169)=3.297, p=0.004
	Locality	:(174)=2.829, p=0.005
	Teaching Level	(2,173)=9.388, p=0.00
Your command at enlarging the screen image	Teaching Level	(2,173)=5.069, p=0.007
	Gender	(174)=-2.034, p=0.044
	Locality	:(174)=2.411, p=0.017
How good are you at scrolling the screen?	Province	=(6,169)=5.443, p=0.037
	Teaching Level	(2,173)=5.677, p=0.004
How comfortable are you reading off the screen?	Province	(6,169)=2.617, p=0.019
	Teaching Level	(2,173)=6.407, p=0.002
	Gender	:(174)=-2.104, p=0.037
	Locality	:(174)=2.899,p=0.004
How much do you use computers and technology in the teaching learning process?	Province	(6,169)=3.263, p=0.005
	Subject	(4,174)=3.356, p=0.011
	Locality	:(174)=5.045, p=0.000

Table 13 shows that the respondents of Islamabad Capital territory and GB had more computer proficiency F (6,169) =3.917, p=0.001, whereas the respondents of AJK had less computer proficiency. A significant difference F (2,173) =9.388, p=0.000 regarding computer proficiency was also found regarding teaching level where higher secondary school level teachers had more computer proficiency than elementary school teachers. Similarly, a significant difference t (174) =2.834, p=0.05 was also found w.r.t urban and rural level. Where respondents of urban locality had more computer proficiency than respondents of rural areas. Significant differences were also found regarding manipulative skills of the mouse. The analysis showed that the respondents from ICT had more manipulative skills than AJK, F (6,169) =3.297, p=0.004, the respondents from urban areas had more t= (174) =2.829, p=0.005 manipulative mouse skills than respondents from rural areas. Similarly, the secondary school teachers were found to have more F (2,173) =9.388, p=0.00 manipulative mouse

skills than elementary teachers. Significant differences were found w.r.t teaching level where secondary school teachers could enlarge the screen more proficiently F (2,173) =5.069, p=0.007 than the teachers of elementary level. Similarly, the male teachers were more t (174) =-2.034, p=0.044 proficient in enlarging the screen than female teachers. Whereas teachers from urban locality also had good t= (174) =2.411, p=0.017 computer proficiency for enlarging the screen. The male was also found more t= (174) =-2.104, p=0.037 proficient for reading off screen than female respondents. Similarly, the respondents from urban areas also had more t= (174) =2.899, p=0.004 scrolling skills than the respondents of rural areas.

Section 4 Previous Marking Experience

Table 14. *On Paper Marking Per Hour of Respondents*

Statement	N	Mean
Approximately how many scripts an hour was you able to mark on paper? (circle)	176	7.647

Table 14 shows that most of the respondents could mark almost 8 answer scripts per hour on paper previously.

Table 15. *Low (positive) mean score of Previous Marking Experience*

Statements	N	Mean	SD
How reliable do you feel your marking on paper was in the past?	176	2.2955	1.36201
Is feedback of Head Examiner supportive in real time during on screen marking?	176	2.7386	1.30489

Table 15 shows the low (positive) previous marking experience. It shows that respondents felt that “on paper marking” is more reliable (M=2.299, SD=1.39). The participants also responded that during on screen marking the feedback of head examiner was supportive in real time (M=2.73, SD=1.30).

Table 16. *Significant Differences*

tatements	Variable	Significance
How reliable do you feel your marking on paper was in the past?	Subject	(4,171)=8.575, p=0.001
	Gender	174)=2.178, p=0.031
	Locality	174)=-4.495, p=0.000
Is feedback of Head Examiner supportive real time during on screen marking?	Profession	(1,174)=4.984, p=0.027
	Subject	(4,171)=4.280, p=0.038
	Locality (Rural,[Urban]	174)=2.527,p=0.012

Table 16 shows significant difference was found the respect to subject, where chemistry teachers felt on paper marking more reliable F (4,171)=8.575, p=0.001 than computer science teachers. Besides this, both male and female teachers considered “on paper” marking more reliable. However, female respondents also considered on paper marking more reliable t (174) =2.178, p=0.031than male respondents. A significant difference t (174) =-4.495, p=0.000 was also found regarding respondents from urban locality that respondents of rural locality. Most of the administrative respondents F (1,174) =4.984, p=0.027 also considered that the feedback of the head examiner was supportive for on screen marking. Moreover, the biology teachers were also of the opinion that the feedback of the head teacher was supportive in real time during on-screen marking F (4,171) =4.280, p=0.038 but the

chemistry teachers did not think so. A significant difference was also found regarding this statement w.r.t rural and urban localities where respondent of rural locality were found more satisfied regarding feedback of head examiner than the respondents of urban locality t(174)=2.527,p=0.012.

Table 17. High *(Low) mean score of Previous Marking Experience*

Statements	N	Mean	Std. Deviation
How often did you need to take a break while marking on paper?	176	3.0682	1.26306
How tired did your eyes get when marking on paper?	176	3.3523	1.29208
How demanding did you find it familiarizing yourself with the marking guidelines of all the questions?	176	3.6818	1.41458
How did you view having to do the clerical work associated with marking on paper?	176	3.2273	1.37510

Table 17 shows the high (low) mean score of previous marking experience. It shows that the respondents frequently took breaks while on paper marking M=3.06, SD=1.26. Moreover, their eyes also got tired for on-paper marking M=3.35, SD=1.29. Respondents also thought that on paper marking demands familiarizing themselves with the questions M=3.68, SD=1.41.

Table 18. *Significant Differences*

Statements	Variable	Significance
How often did you need to take a break while marking on paper?	rovince eaching Level	(6,169)=3.916, p=0.020 (12,173)=8.8662, p=0.000
3. How tired did your eyes get when marking on paper?	rovince eaching Level ɔcality	(6,169)=3.305, p=0.004 (2,173)=5.871, p=0.029 174)=-4.098, p=0.000
How did you view having to do the clerical work associated with marking on paper?	rofession ubject eaching Level	(1,174)=6.973, p=0.009 (4,171)=5.257, p=0.001 (2,173)=12.018, p=0.000

Table 18 shows significant differences of high (Low) mean score of previous marking experience. The respondents of AJK feel that they required frequent breaks for on paper marking F (6,169) =3.916, p=0.020 whereas the respondents of ICT did not think so. Similarly, the teachers at elementary level also responded that they had to take frequent breaks for on paper marking F (12,173) =8.8662, p=0.000 whereas the teachers of higher secondary level set that don't break for on paper marking. The administrators viewed more clerical work associated with marking on paper F (1,174)=6.973, p=0.009 as compared to teachers. Similarly, the chemistry teachers do not consider the on paper marking as clerical work F (4,171) =5.257, p=0.001, whereas the respondents of computer science department consider on paper marking a “troublesome”. The respondents of elementary teachers also consider the clerical work associated with the on paper marking a “troublesome” F (2,173) =12.018, p=0.000, whereas the respondents of secondary teachers responded that they did not have any problem regarding on paper marking.

Section 5 Expectations of the onscreen marking (OSM) experience

Table 19. *Approximation of questions mark per hour Onscreen*

Statement	N	Mean
Your expected number of questions to mark per hour on screen	176	19.88

Table 19 shows that respondents had expectations to mark approximately 20 papers per hour on screen.

Table 20. *Previous Onscreen Marking Experience*

Statement	Responses	Frequency	Percent
Do you have onscreen marking experience previously?	No	138	78.4
	Yes	38	21.6
	Total	176	100.0

Table 20 shows that 78% of respondents did not have on screen marking previously, whereas 22% have such experience.

Table 21. *Travel to a Special Marking Center*

Statement	Responses	Frequency	Percent
How do you feel about having to travel to a special marking center?	No problem	88	50.0
	Very inconvenient	88	50.0
	Total	176	100.0

Table 21 shows that 50% respondent they have no problem if they will have to travel to a special place to mark papers on screen, whereas 50% respondents free that they will feel very inconvenient if they will have to travel to a special place for on screen marking.

Table 22. *Preferable Language for OSM*

Statement	Language	Frequency	Percent
Your preferable language to mark on screen	English	158	89.8
	Urdu	18	10.2
	Total	176	100.0

Table 22 shows that almost 90% respondents recommended English language for on-screen marking whereas 10% respondents preferred Urdu language for on-screen marking.

Table 23. *Low (positive) mean score of Expectations for the onscreen marking (OSM) experience.*

Statement	N	Mean	SD
What is your expectation for your onscreen marking experience	176	2.6250	1.25868
How much do you feel on screen marking reliable?	176	2.5341	1.38522
Will you prefer to mark at home or at a specific marking center?	176	2.4205	1.78707
How do you feel about the move from paper-based to on screen marking?	176	2.659	1.6204

Table 23 shows the low (positive) mean score of expectations for on screen marketing experience. The respondents have positive expectations regarding on screen marking. According to the respondents they expect a very good M=2.62, SD=1.25 online on-screen experience. They also expect that on screen marking will be very reliable M=2.53, SD=1.38. The respondents also preferred (M=2.42, SD= 1.78) to do marking at home rather than at a specific marking center for on-screen marking. Respondents also feel the on-screen marking a very good move M=2.659, SD=1.62 from paper base marking.

Table 24. *Significant Differences*

Statement	Variable	Significance
What do you expect your onscreen marking experience will be like?	Province Locality	(6,169)=2.918, p=0.010 174)=2.912, p=0.004
How reliable do you feel you're marking on screen will be?	Province	(6,169)=4.486, p=0.000
Would you prefer to mark at home or at a special marking center?	Province Profession Subject Locality	(6,169)=2.469, p=0.026 (1,174)=24.826, p=0.005 (4,171)=3.025, p=0.019 (174)=1.699,p=0.091
How do you feel about the move from paper-based to on screen marking?	Qualification Profession Subject	(3,172)=3.273, p=0.023 (1,174)=7.091, p=0.008 (4,171)=2.797, p=0.028

Table 24 shows significant differences for low positive score of expectations for on-screen marking. The respondents of rural areas also expect a good on-screen marking experience t (174) =2.912, p=0.004. Nearly all the respondents except from GB think that on-screen marking will be very reliable. The respondents of AJK had more positive feelings that on screen marking will more reliable F(6,169)=4.486, p=0.000 whereas the respondents of GB do not consider on screen marking a very good move. Respondents of AJK and KPK preferred to mark papers at home F (6,169) =2.469, p=0.026, whereas the respondents of Baluchistan preferred to mark papers at marketing centers. Both teachers and administrators were also of the opinion to mark papers at home, however significant difference was found where administrators were more in this favor to mark papers at home than teachers F(1,174)=24.826, p=0.005. Biology teachers were more inclined to mark papers at home F (4,171) =3.025, p=0.019 as compared to others. Both the respondents of rural and urban areas also prefer to mark paper at home t (174) =1.699, p=0.091 rather than to mark at specials centers, however, the respondents of rural areas were more in this favor. The respondents having PhD degrees expect that on screen marking will be a good move F (3,172)=3.273, p=0.023, whereas the respondents having graduation degree considered it a bad move. Similarly the administrators and teachers both were in favor of on screen marking and considered it a good move F(1,174)=7.091, p=0.008 whereas administrators were more in this favor. The computer science teachers considered on screen marking a good move F (4,171) =2.797, p=0.028 whereas physics teachers did not consider it a good move.

Table 25. High (negative*) mean score of Expectations of the on-screen marking (OSM) experience.*

Statements	N	Mean	Std. Deviation
How much training do you feel you will require for on screen marking?	176	3.7727	1.52486
How concerned are you about your eyes getting tired through marking on screen?	176	4.0114	1.42223
How often will you need breaks while doing marking on Screen	176	3.7955	1.34512
Your current preference to mark on screen or on paper	176	3.5227	1.97688

Table 25 shows the high (negative) mean score of the statements regarding expectations of on-screen marketing experience. The respondents required a great deal of training for on screen marking M=3.77, SD=1.52. They also responded that they are more concerned about the eyes getting tired through on-screen marking M=4.011, SD=1.42. The respondents also feel that they require frequent breaks while marking on screen M=3.79, SD=1.34. Currently, they also prefer to mark answer scripts on paper M=3.522, SD=1.97.

Table 26. *Significant differences*

Statement	Variable	Significance
How much training do you feel you will require for on screen marking?	Qualification	(3,172)=3.297, p=0.022
	Subject	(4,171)=3.816, p=0.005
	Teaching Level	(2,173)=4.638, p=0.011
How concerned are you about your eyes get tired during marking on screen?	Province	(6,169)=6.544, p=0.003
	Subject	(4,171)=5.651, p=0.023
	Gender	174)=-4.261, p=0.000
How often will you need breaks while doing marking on screen?	Subject	(4,171)=5.998, p=0.009
	Gender	174)=-4.261, p=0.000
Your current preference to mark on screen or on paper	Province	(6,169)=2.786, p=0.013
	Profession	(1,174)=6.130, p=0.014
	Gender	174)=-3.568,p=0.000
	Locality	174)=2.275,0.024

Table 26 shows significant differences in high (negative) mean score of expectations of the onscreen marking (OSM) experience. The respondents having graduation degrees expected to have extensive training for on screen marking F (3,172) =3.297, p=0.022 whereas the respondents having M.Phil. degree demanded not too much extensive training for on screen marking. The mathematics teachers also required extensive training for on screen marking F (4,171) =3.816, p=0.005 whereas physics teachers require little training. Similar trend was found for elementary teachers who also expect extensive training whereas secondary teachers require very less training F (2,173) =4.638, p=0.011. The respondents of Baluchistan were also very much concerned about their eyes getting tired while on screen marking F (6,169) =6.544, p=0.003. Similarly, the biology teachers also responded that they are also very much concerned about their eyes getting tired for our screen marking F (4,171) =5.651, p=0.023whereas physics teachers did not think so. Significant difference was also found regarding the same statement where female teachers also responded that they were more concerned about their eyes t (174) =-4.261, p=0.000, whereas male teachers did not think so. Mathematics teachers responded that they would need frequent breaks F (4,171) =5.998, p=0.009 while on screen marking. Whereas physics teachers did not think so. similarly, female teachers also think that they will require frequent breaks while on screen marking whereas male did not think so t(174)=-4.261, p=0.000. When the respondents were asked about their preferences for onscreen marking or on paper marking, significant differences were found regarding it. The respondents of Punjab preferred on paper marking F (6,169) =2.786, p=0.013 whereas respondents of AJK asked for OSM. Similarly, teachers prefer on paper marking F (1,174) =6.130, p=0.014, whereas administrators prefer OSM. Similarly, both male and female currently prefer on paper marking however, female preferred more for on paper marking t(174)=-3.568,p=0.000. The respondents of rural areas currently preferred on screen marking t (174) =2.275, 0.024, whereas the respondents of urban areas prefer on paper marking.

Discussion

In this study perceptions of teachers and administrators were sought out about on screen marking as now a days, different examination boards/examination bodies are inclined towards it. Most of the respondents did not have any on screen marking experience previously. The analysis shows that the teachers had a positive attitude for the on screen marking and all the respondents had a clear realization of its need and utility for the papers checking, aligned with the Coniam (2013) found positive attitude of examiners towards onscreen marking. However, they did not consider on screen marking an easy assessment. As Bingimlas (2009) found that the combination of teacher (examiner), school and system level obstacles are the barriers to inculcate computer technology in classrooms, while barriers at the teacher (examiner) level include a lack of computer proficiency, enthusiasm, and confidence in integrating modern technology in the classroom, which are related to continuous professional development of examines (Zubković, Pahljina-Reinić & Kolić-Vehovec, 2022). Nearly all the respondents had good computer proficiency, could manipulate the mouse, could enlarge the screen image, good to scroll the screen, comfortable for off- screen reading, and they used computers and technology in their teaching learning process. However significant differences were found with respect to different demographic variables cities, school level, gender, area and rural areas. The analysis showed that respondent could mark eight answer subscripts per hour on paper and considered on paper marking more reliable. The findings were found to be similar in the context of reliability (Coniam, 2010). Whereas the respondents were more satisfied with the on-spot feedback from head examiners while on screen marking. However significant differences were found in the different demographic variables teaching chemistry and biology subjects and area. The administrators also believed they got supportive real time feedback during on-screen marking. According to the respondents, they used to take frequent breaks while on paper marking. Respondents also had a high score regarding familiarizing themselves with the questions for on paper marking. However, respondents replied that their eyes get tired while on paper marking. Significant differences of high (Low) mean score of previous marking experience were also found w.r.t different demographics. Respondents also expected to mark 20 papers per hour on screen. This might be due to the reason that the respondents have a highly positive attitude towards on screen marking. There was almost the same response regarding travelling to a special marking center for on-screen marking. The respondents also preferred English language for on screen marking. This might be due to the reason that it is easy to read and write English language on screen rather than other languages. Similarly, feedback can be easily given in English language as compared to Urdu language. The respondents also preferred to grade at home rather than at a specific marking center for on-screen marking. Respondents also feel the on-screen marking a very good move from paper-based marketing. However significant differences were found with respect to different demographic variables.

The respondents having PhD degrees expect that on screen marking will be a good move, whereas the respondents having graduation degree considered it a bad move. This might be due to the difference in qualifications and more awareness about digital literacy and electronic gadgets. Similarly, the administrators and teachers both were in favor of on screen marking and considered it a good move whereas administrators were more in this favor. According to the respondents, they required a great deal of training in on-screen marking. They also responded that they were more concerned about the eyes getting tired through on-screen marking. The respondents also feel that they require frequent breaks during on-screen marking. Currently, their preference is to grade answer scripts on paper instead of on screen. This might be due to the reason that the respondents do not have computer proficiency or training in on-screen marking. The respondents having graduation degree expected to have extensive training for on screen marking whereas the respondents having M.Phil.

degree demanded not too much extensive training for on screen marking. This shows that the teachers having less qualifications require more computer training. When the respondents were asked about their preferences for onscreen marking or on paper marking, significant differences were found regarding it. According to teachers, currently they prefer paper marking, whereas administrators prefer OSM. This supports earlier findings, where administrators prefer on screen marking. Similarly, both male and female "currently" prefer on paper marking however, female preferred more on paper marking. Might be due to the reason that female have less computer proficiency and training for on-screen marking. The respondents of rural areas also preferred on-screen marking, whereas the respondents of urban areas preferred on- paper marking. This might be due to the reason that the world is still facing COVID, therefore, respondents of the rural areas will prefer to mark papers on screen.

Conclusion

This study explored the perception of teachers and administrators regarding on screen marking in Pakistan. This study would be helpful for the implementation of onscreen marking at a larger scale. In this study the attitude towards on-screen marking was also sought out and the answers to research questions were obtained. Nearly all the respondents had a positive attitude towards on-screen marking. Computer proficiency is an essential factor in the implementation of a computerized marking system. However significant differences were found regarding computer proficiency with respect to different locality of the country. Similarly male were found more computer proficient than females. The respondents were expecting to mark more papers on screen. However, the respondents also considered paper marking more reliable than on screen marking. The mathematics teachers consider the clerical work of on paper marking a "troublesome", whereas the respondents of computer science department did not think so. The respondents of elementary teachers also consider the clerical work associated with the on paper marking a "troublesome", whereas the respondents of secondary teachers responded that they did not have any problem regarding on paper marking. The attitude of teachers and administrators towards OSM differs w.r.t locality, teaching level, the subject being taught, and gender. The chemistry teachers considered paper marking more reliable. The respondents having less computer proficiency took frequent breaks for on paper marking. Beside all these, the respondents expect to mark more than twice papers on screen. However, there is mixed response regarding travelling to a special marketing center for on screen marking, where female respondents and respondents from rural areas prefer to mark paper at homes in the on-screen mode. Finally, those individuals having higher educational degrees considered the on screen marking a good move similarly the respondents of computer science department also considered it a good initiative.

Recommendations

- There is need to sensitize the academia for the need of on-screen marking in this digital era.
- Extensive training must be provided to the respondents in order to increase their computer proficiency.
- Electronic gadgets must be provided to the teachers to mark papers on screen easily.

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References

Ahmed, R., Mehmood, S. T. & Javed, T. (2021). Assessment of secondary school students' digital citizenship, *Journal of Science Education, 3* (2), 1-20.

An, H., & Chen, I. (2022). Exam chain: A privacy-preserving onscreen marking system based on consortium block chain, *IEICE Transaction Information and Systems, 105* (2), 235-247, doi: 10.1587/transinf.2021BCP0004

Aydemir, Z., Öztürk, E., & Horzum, M. B. (2013). The effect of reading from screen on the 5th grade elementary students' level of reading comprehension on informative and narrative type of texts Educational Sciences, *Theory and Practice, 13* (4) (2013), 2272-2276

Beavis, J., Morgan, J.M., & Pickering, J.W. (2012). Testing nursing staff competencies using an online education module.

Bingimlas, K.A. (2009). Barriers to the successful integration of ICT in teaching and learning environments: A review of the literature. *Eurasia Journal of Mathematics, Science & Technology Education, 5* (3), 235-245.

Choudhary, F. R., & Javed, T. (2021). Use of computer simulations for the understanding and retention of mathematical concept, *International Journal of Innovation in Teaching and Learning IJITL, 7* (2), 70-86

Coniam, D. (2010). Validating onscreen marking in Hong Kong, *Asia Pacific Education. Review, 11*, 423 - 431, https://doi.org/10.1007/s12564-009-9068-2

Coniam, D. (2013). The increasing acceptance on onscreen marking – the 'tablet computer' effect, *Educational Technology & Society, 16* (3), 119-129.

Coniam, D., & Yeung, S. A. (2010). Markers' perceptions regarding the onscreen marking of liberal studies in the Hong Kong public examination system, *Asia Pacific Journal of Education, 30* (3), 249-271, doi: 10.1080/02188791.2010.495836

DRS(2014). First pilot of electronic marking in Africa sees growing take-up, as Zimbabwe School Examinations Council increases speed of delivery and accuracy using DRS eMarker® technology. Retrieved from www.drs.co.uk.Accessed 10 January 2015.

Freake, S. (2008). Electronic marking of physics assignments using a tablet PC. *New directions in the teaching of physical sciences*,12-16.

Fuller, J. S., & Dawson, K. M. (2017). Student response systems for formative assessment: Literature-based strategies and findings from a middle school implementation, *Contemporary Educational Technology, 8* (4), 370–389.

Golan, D. D., Barzillai, M., & Katzir, T. (2018). The effect of presentation mode on children's reading preferences, performance, and self-evaluations. *Computers & Education*, *126*, 346-358.

Haggie, D. 2008. The strategic use of marking technologies to support innovation and diversity in assessment.

Halamish, V., & Elbaz, E. (2020). Children's reading comprehension and meta comprehension on screen versus on paper. *Computers & Education*, *145*, 103737.

Harding, R., & Raikes, N. (2002). ICT in Assessment and Learning: The Evolving Role of an External Examinations Board, paper presented at Second SCROLLA Symposium, Herriot-Watt University, 6 February 2002.

Johnson, M., Nádas, R. & Bell, J.F. (2010). Marking essays on screen: An investigation into the reliability of marking extended subjective texts. *British Journal of Educational Technology,41(5),* 814–826.

Kortemeyer, G. (2016). The psychometric properties of classroom response system data: A case study. *Journal of Science Education and Technology 25* (4): 561–574.

Liu, Y. & Liu,J. (2023). Comparing computer-based and paper-based rating modes in an English writing test. *Assessing Writing,57*,100771.

Mullis, I. V., Martin, M. O., & von Davier, M. (2021). TIMSS 2023 Assessment Frameworks. *International Association for the Evaluation of Educational Achievement*.

Ofqual(2013). Review of quality of marking in exams in A levels, GCSEs and other academic qualifications: Interim Report. Retrieved from www.ofqual.gov.uk

Ofqual(2014). Review of quality of marking in exams in A levels, GCSEs and other academic qualifications: Final Report.

Porion, A., Aparicio, X., Megalakaki, O., Robert, A., & Baccino, T. (2016). The impact of paper-based versus computerized presentation on text comprehension and memorization, *Computers in Human Behavior, 54* (2016), 569-579, doi: 10.1016/j.chb.2015.08.002

Noyes, J. M., & Garland, K. J. (2008). Computer-vs. Paper - based tasks: Are they equivalent? *Ergonomics, 51* (9), 1352-1375, doi: 10.1080/1201400130802170387

Gorard, B.H., Lu.S., Binwei., Dong, L., & Siddiqui, N. (2022). Is technology always helpful?: A critical review of the impact on learning outcomes of education technology in supporting formative assessment in school, *Research Papers in Education, 37* (6), 1064-1096, doi: 10.1080/02671522.2021.1907778

Sitthiworachart, J., Joy, M.S., & Sutinen, E. (2008). Success Factors for e-Assessment in Computer Science Education. Association for the Advancement of Computing in Education (AACE), 2287-2293.

Rockinson-Szapkiw, A. J., Courduff, J., Carter, K., & Bennett, D. (2013). Electronic versus traditional print textbooks: A comparison study on the influence of university students' learning. *Computers & Education*, *63*, 259-266.

Singer, L. M., & Alexander, P. A. (2017). Reading on paper and digitally: What the past decades of empirical research reveal. *Review of educational research*, *87*(6), 1007-1041.

Song, D., Oh, E. Y., & Glazewski, K. (2017). Student-generated questioning activity in second language courses using a customized personal response system: A case study, *Educational Technology Research and Development. 65*, 1425-1449, doi: 10.1007/s11423-017-9520-7

Shavkatovna. U. Z., & Anvarovich, M. D. (2022). Opportunities of using electronic educational tools in assessing students' knowledge skills, *Web of Scholars: Multidimensional Research Journal, 1* (5), 131-135, doi: 10.17605/OSF-IO/6px2R

Shaw, S. (2008). Essay marking on-screen: Implications for assessment validity, *E-Learning and Digital Media, 5* (3), 256-274. doi:102304/elea.2008.5.3.256

Swart, A.J. (2013). Onscreen marking: An effective assessment tool for engineering education in the information age. International Conference of Engineering Education and Research, ICEE/ICIT2013, Cape Town, South

Twing, J.S., Nicholas, P.D., & Harrrison, I. (2003), The comparability of paper-based and Image-based marking of a high stake, large scale writing assessment, 29th IAEA Annual Conference Proceedings, Manchester, UK.

Wang, A. I. (2015). The wear out effect of a game-based student response system, *Computers & Education 82*, 217–227.

Whetton, C. & Newton, P. (2002), An evaluation of online marking, 28th IAEA Annual Conference Proceedings, Hong Kong SAR, China.

Yang, M., Yan, Z., & Coniam, D. (2018). A qualitative study of markers' perceptions on onscreen marking in five subject areas, *An International Journal of Theory and Practice, 23* (8), 290-310, doi: https://doi.org/10.1080/13803611.2018.1446836

Zubković, B. R., Pahljina-Reinić, R., & Kolić-Vehovec, S. (2022). Predictors of ICT use in teaching in different educational domains, *Humanities Today: Proceedings, 1*(1), 75-91.