

# Usability of Exam Sheet Grading Application

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## ABSTRACT

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Many teachers, instructors, and professors make question paper easily, but they have to face difficulty to check the answer sheets of a number of students in a short period of time. Exam Reader is an application through which teachers can easily create an answer sheet in just 1 minute and make the result quickly and easily just by scanning the answer sheets of the students. In this paper, we discuss which method is better and easier for the teachers to check multiple-choice tests, quizzes and assessment papers manually or by scanning through Exam Reader application. We perform a usability evaluation of Exam Reader application. For this purpose, almost eighty participants (i.e. teachers, instructors, and professors) are chosen from different age groups and from different departments. Forty participants of Computer Science background and others from different backgrounds. After this usability evaluation, the results show that the young teachers preferred to grade exam papers using Exam Reader Application and the teachers with Computer Science background preferred to use Exam Reader Application for grading exam papers quickly and efficiently.

**Keywords:** Usability, Exam Reader, OMR, Automatic Grading, Scanning, Manual Grading.

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## INTRODUCTION

Nowadays, mobile applications are growing quickly in their scope and extend of use affecting all aspects of our life. Many industries are using mobile applications to increase and improve their business. Currently, a number of technologies are introducing day by day, which should be utilized in public or private institutions to shorten the time required for manual checking and simultaneously to reduce human errors and increasing accuracy.

Exam Reader is an exam sheet grading application for mobile phones and tablets [<https://bebyaz.com/ExamReader>]. Using this application, you can grade multiple-choice tests, quizzes and assessment papers by using your phone's camera as a grading scanner. This application is based on Optical Mark Recognition (OMR) technology. OMR is the process of detecting human marked data from the document. Students fill the bubble sheet by shading the corresponding bubble. Using OMR technology, the Exam Reader application scans the document and reads the data from the marked fields and match with the Key provided by the Instructor. This technique helps to reduce the time but requires the use of a formatted answer sheet where the response markings are predictably positioned. The formatted answer sheet can be easily created using the Exam Reader application.

In this paper, the author will conduct a usability evaluation of the Exam Reader application. According to the standard ISO 9241-11 usability is: "the extent to which a software can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use". The author will use usability as a tool to perform an experiment on different Faculty Teachers/Professors using this application and to find out their remarks with usability testing and questionnaires.

## BACKGROUND

Scanners are used to scan bubble sheets as well as analyze and grade them. But this procedure is very difficult for non-computer science teachers. For this, a Computer Assistant is needed for operating the device and to

perform all the steps of scanning. A large setup should develop with a number of employees for performing the scanning operations which can be very costly for the institution to handle it.

Nowadays, several applications for grading exam sheets are introduced based on OMR technology. Any person can easily create a bubble sheet, scan their sheets using their mobile camera and view their result in just one minute by using multiple exam grading applications.

## **METHODOLOGY**

### **Participants**

The participants chosen for the evaluation purpose are distinguished with computer science and non-computer science background. Almost Eighty participants are selected for this study with different age groups. 40 participants are from the computer science department and the other 40 participants are from different departments including Islamic Studies, Education, Mathematics, and Pharmacy department. All participants were first-time users of the Exam Reader application.

### **Experiment**

For the evaluation of the Exam Reader application, different Faculty participants are involved to perform the number of tasks in Table 1 during the experiments and to verbalize their thoughts and experiences while interacting with the system. The observer will observe and record their experience during the experiment.

**Table 1.** Task Set.

<b>No.</b>	<b>Task Name</b>	<b>Task Details</b>
1a	Create Sheet	The user has to create a sheet, in which a form has to be filled for creating a bubble sheet according to exam requirements.
1b	View Settings	The user has to view settings to adjust more sheet settings like marks options, etc.
2a	Generate Key	The user has to generate the answer key. Can generate manually by providing answer to each option or can scan the correct answer key.
2b	Key Save / Load	Save an answer key and load it when you need it.
3	Scan Answer Sheets	At last, user has to scan multiple answer sheets of the students.

The objective of this paper is to compare our evaluation results with the hypothesis that what type of users with different age groups and backgrounds will prefer which type of grading method, manually or scanning using Exam Reader mobile application. Following are the list of hypothesis, preceded by the discussion.

### **Hypothesis**

1. Younger participants prefer to use this application for grading the exam sheets as compared to older participants.
2. Older participants prefer to check exam sheets manually.
3. Participants with a computer science background will prefer this application.
4. Participants with a non-computer science background don't want to use this application.

### Task Analysis

This section is a task-by-task analysis of the performance of the participants and comparing the result with the hypothesis. Following scale is followed to grade the task success.

- 1 = got it quickly
- 2 = got it eventually
- 3 = needed help tutorial

**Task 1.** Create a Bubble Sheet and change Settings.

A Task is assigned to the participants with different backgrounds, to create an answer sheet and change some settings. Participants have to create total 100 questions; the number of choices must be 4 with a horizontal orientation. Page size must be A4 and Language should be English. After creating a sheet, participants must go to setting options and apply marks i.e. 2 wrong answers will decrease 1 mark.

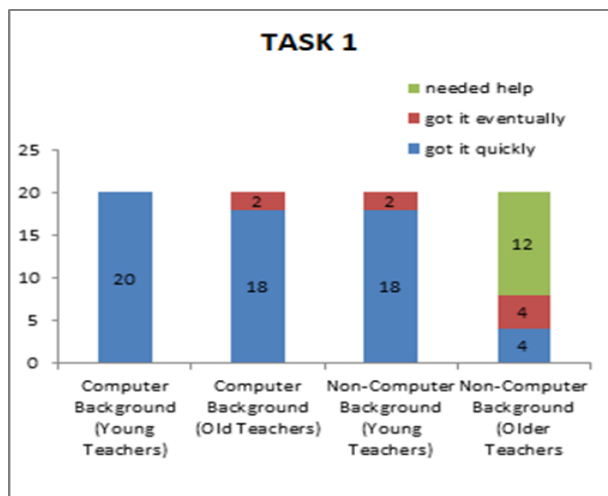


Figure 1.

### Result

#### Participants with Computer Science Background

40 out of 38 participants successfully created an answer sheet quickly. Total 2 participants i.e. Old Teachers take some time for the completion of the task but successfully completed on their own.

#### Participants with Non-Computer Science Background

40 out of 28 participant’s mostly young teachers successfully created an answer sheet on their own. But 12 participants mostly old teachers needed help for the creation of an answer sheet.

### Observation

As shown in Figure (1), mostly old Teachers with non-computer science background find difficulty to create an answer sheet as they don’t know where to go which option creates the sheet due to first time users of this application. So guidance is needed for these participants.

**Task 2.** Generate Key and Save/Load Key

After completion of the first task, participants have to generate a key for the answer sheet. There are two key entry types: Manual or Scan. Participants can use anyone from these types. After this, participants have to save that key and load it using the Save/Load Key option. Participants can easily use this key when they want to scan the answer sheet.

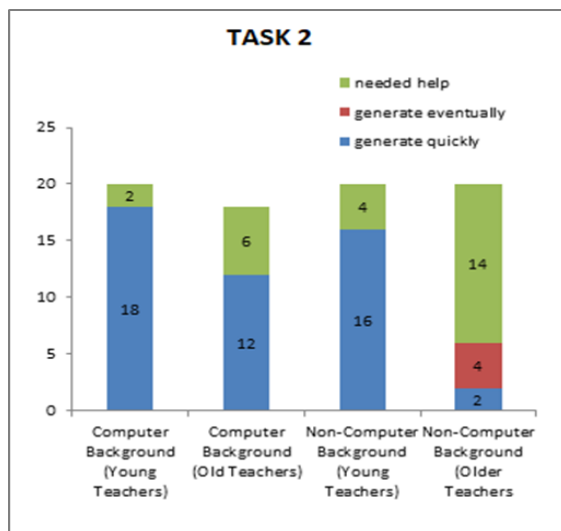


Figure 2.

**Result**

As the total number of questions are 100, so all participants choose Scan key entry type to generate the key as it is less time taken.

**Participants with Computer Science Background**

40 out of 30 participants successfully generate key by scanning it quickly without any difficulty and save this key by creating a folder without any personal guidance. Total 6 participants that belong from the old age group needed help to generate the key by scanning.

**Participants with Non-Computer Science Background**

40 out of 28 participant’s mostly young teachers successfully perform the given task. 4 participants take some time to generate key but they complete their task by themself. Total 18 participants mostly old teachers needed help to generate the key by scanning.

**Observation.**

As shown in Figure (2), mostly old teachers with non-computer science background face difficulty to generate the key due to the first time of using such types of applications.

**Task 3. Scan Answer Sheets**

The last and main task for the participants is to scan the answer sheet (bubble sheet) that they generated. These answer sheets are already filled by the students for testing purposes.

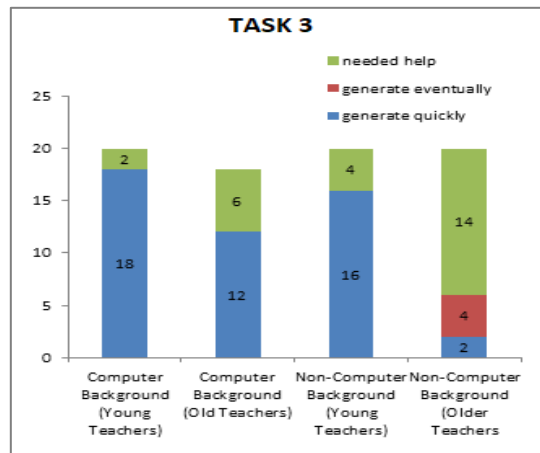


Figure 1.

### Result

#### Participants with Computer Science Background

40 out of 8 participants need help for scanning the student answer sheets. Otherwise, all teachers scan and grade exam sheets quickly.

#### Participants with Non-Computer Science Background

40 out of 18 participants mostly old teachers face difficulties in scanning the answer sheets but 22 participants scan answer sheets by themselves.

### Observation

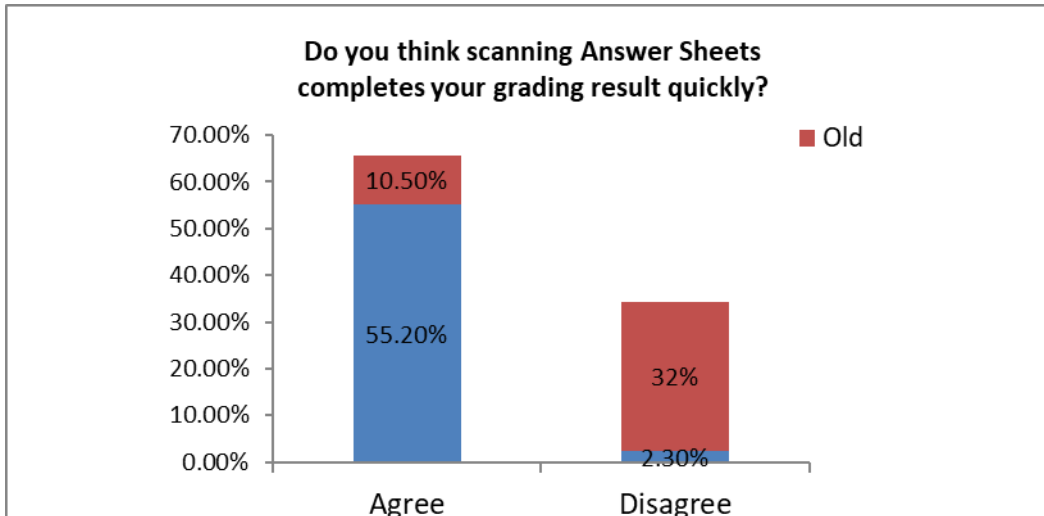
As shown in Figure (3), Old teachers with non-computer science background take time to scan answer sheets due to first time interaction with this type of exam grading application. Another reason for scanning late is camera result issues as their phone camera result is not so much accurate to detect the marked option.

### Statement Analysis

Some statements are putting forward to validate our hypothesis. The results are shown by comparing the statements with our research’s survey.

#### Statement 1

Young people usually like to explore new and different types of applications for making their work easier and quicker. In our context of the first statement, young Teachers will prefer to use exam grading application to scan answers sheets of the students and want to make the grading result as early as possible instead of checking each sheet manually. To support our statement, we asked our participants that, do they think scanning Answer Sheets completes their grading results quickly?

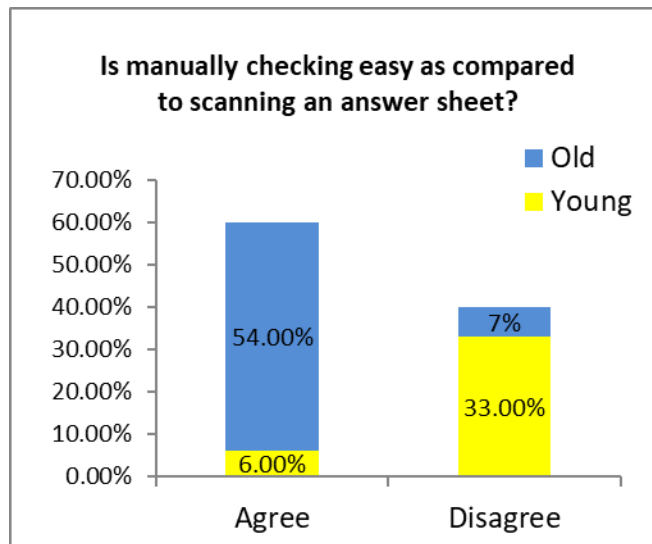


**Figure 4.**

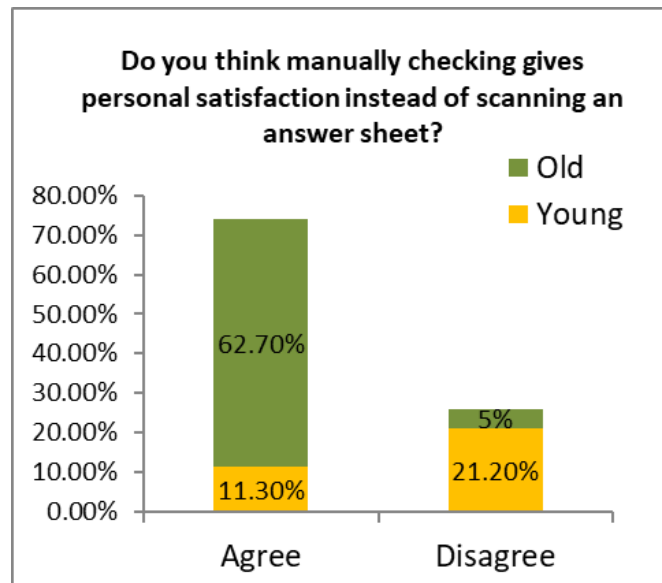
65.7% are Agree to this question as shown in Figure (4) including 55.20% of young teachers. The conclusion of this statement is that young teachers prefer to use the Exam Reader application for scanning student answer sheets to complete grading results quickly instead of checking it manually. This proves that Hypothesis 1 is also true.

**Statement 2**

A new study reveals that older people are rejecting digital technology as they fear to get things wrong when using any software or application. Older people have a lack of confidence in their own knowledge of how to use such applications properly. If they try to use some of these applications they think that they are getting a burden on themselves or it’s just a waste of time. In our context, Older Teachers and Professors, especially government teachers usually don’t accept to use such kind of applications for scanning and grading an answer sheet. They prefer their traditional method of manual checking of students’ answer sheets. To support our statement, we asked our participants that, do they think manually checking gives personal satisfaction instead of scanning an answer sheet? and Is manually checking easy as compared to scanning an answer sheet?



**Figure 5**



**Figure 6**

74% are Agree to this question as shown in Figure (6) including 62.70% of old teachers. 60% are Agree to this question as shown in Figure (5) including 54% of old teachers. The conclusion of this statement is that old teachers prefer to do manual checking of student answer sheets and to make results manually for personal satisfaction. This proves that Hypothesis 2 is also true.

**Statement 3**

In the modern world, people with IT and computer backgrounds avail benefits with the latest technology in their daily life to make their work easier and quicker. In our context, a number of technologies are introduced in public or private institutions to shorten the time required for manual checking and simultaneously to reduce human. 91% are Agree to this question as shown in Figure (8) including 50% of computer background teachers. 88% are Agree to this question as shown in Figure (7) including 50% of computer background teachers. The conclusion of this statement is that the teachers with computer science background are very much satisfied to use this application for grading and scanning student answer sheets and easily perform all assigned tasks early and quickly. This proves that Hypothesis 3 is also true.

Accuracy. To support our statement, we asked our participants that, Do they think manually checking is not only complicated but also raises the chances of human error? And the task they perform can be easily accomplished through exam reader application?

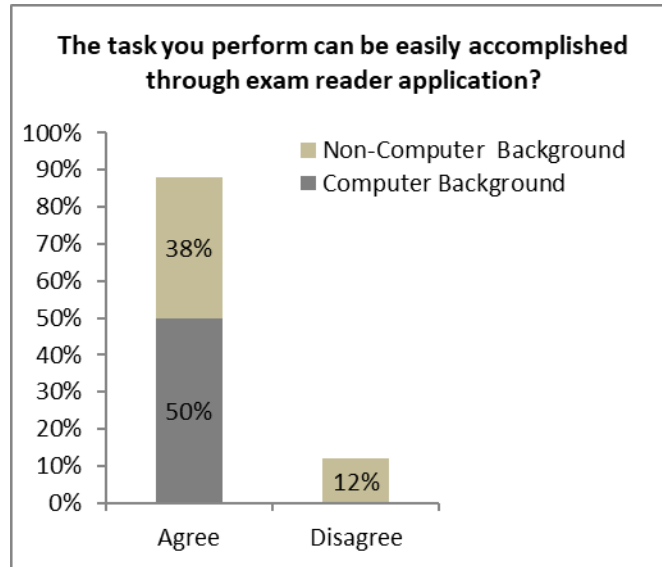


Figure 7

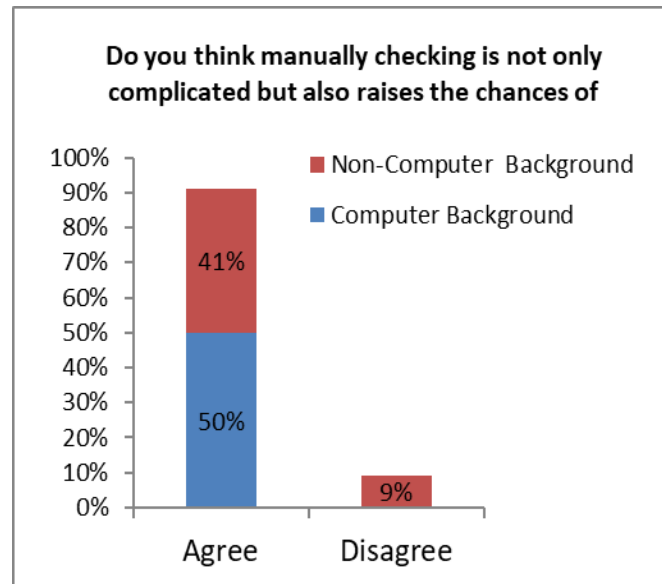


Figure 8

91% are Agree to this question as shown in Figure (8) including 50% of computer background teachers. 88% are Agree to this question as shown in Figure (7) including 50% of computer background teachers. The conclusion of this statement is that the teachers with computer science background are very much satisfied to use this application for grading and scanning student answer sheets and easily perform all assigned tasks early and quickly. This proves that Hypothesis 3 is also true.

No.	Hypothesis	Survey Question	Response	Conclusion
1	Young Teachers prefer to scan exam answer sheets.	Do you think scanning Answer Sheets completes your grading result quickly?	Agree = 65.7% Disagree = 34.3%	Hypothesis 1 = True, if these 65.7% young people agree for scanning so they can easily grade exam sheets using Exam Reading Application.



2	Old Teachers prefer to check exam answer sheets manually.	Do you think manually checking gives personal satisfaction instead of scanning an answer sheet?	Agree = 74% Disagree = 26%	Hypothesis 2 = True, as people agree to follow the traditional method of checking and make results manually for personal satisfaction.
		Is manually checking easy as compared to scanning an answer sheet?	Agree = 60% Disagree = 40%	
3	Teachers with Computer Science background prefer to use this application	Do you think manually checking is not only complicated but also raises the chances of human error?	Agree = 91% Disagree = 9%	Hypothesis 3 = True, as people who don't belong from a computer science background find it difficult to use such exam grading applications and scanning by themself.
		Assume you have to check 100 MCQs, when 2 MCQs are correct, one marks is given to the student. Is this task can be easily accomplished through exam reader application?	Agree = 88% Disagree = 12%	
	Teachers with a non-Computer Science background do not prefer to use this application.	Using Exam Reader Application is a frustrating experience?	Yes = 51.7% No = 48.3%	
		Scanning an answer sheet through application is a difficult procedure?	Yes = 49.9% No = 49.1%	
		Sometimes scanning might not be so accurate as compared to manually.	Agree = 63.6% Disagree = 36.4%	

## CONCLUSION

The purpose of this research work is to conduct a usability evaluation of the Exam Reader application. It should be noted that only the first time users of this application are involved in this study. Therefore, there are some of the issues that may not be found during the second time use of this application. Exam Reader is an exam sheet grading application for mobile phones and tablet so this application is very beneficial for the Professors, Teachers and Instructors belongs from educational institution. The usability evaluation is conducted with faculty teachers from Jinnah University for Women and different school teachers.

According to the experiment and survey results, author conclude that, Young Professors/Teachers prefer to scan exam answer sheets using Exam Reader app. Old/Aged Professors/Teachers prefer to check exam answer sheets manually and Professors/Teachers having Computer Science background prefer to use this type of exam checking applications whereas, Professors/Teachers having a non-Computer Science background don't want to use these types of exam checking applications.

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