A Secure Paperless Assessment Software Question*Mark* Perception

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ABSTRACT

Many universities in the Kingdom are supporting course delivery and course assessment by learning management systems (LMS) such as Blackboard. Questionmark Perception (QMP) allows authoring, management, scheduled delivery, reporting, and analysis of examinations. This tool was tested with level three medical biochemistry students in the College of Medicine, King Khalid University during semesters I and II (2013/2014). The tool was evaluated to provide analysis on the final theory exam according to medical education guidelines. QMP was used to prepare the question papers for two exams wherein 291 students (193 boys and 98 girls) took the exam. QMP authoring manager was used to collect the required questions for the exams. Questions were all multiple choices type 1. Selected questions were then used to create the assessment and randomized both in terms of the stem and the choices at the time of delivery. QMP reporter was used to provide statistical analysis of the questions and student performance. All the students completed the online exam well in time. This exam represented 35% of the total grade. QMP analysis for the two online exams was very similar with most of the questions being moderately difficult and had a Cronbach's Alpha reliability index of 0.88.

KEYWORDS

Assessment, Blackboard, Questionmark Perception, Analysis, Online.

1. INTRODUCTION

Web-based learning approach is opening all gates for current teaching and learning processes in higher education. Several educational institutions worldwide have adopted different course management systems (CMS). These platforms facilitate almost all facets of online teaching and assessing students [1-4]. In Saudi Arabia, such systems were introduced to support course delivery and course assessment by using e-Learning and learning management systems (LMS) such as Blackboard [5,6]. Questionmark Perception (QMP) is a powerful collaborative add-on tool that provides an offline/online independent assessment tool for tests, surveys and exams. This powerful tool allows authoring, management, scheduled delivery, reporting, and analysis of tests and examinations [7, 8] as illustrated in Figure 1.

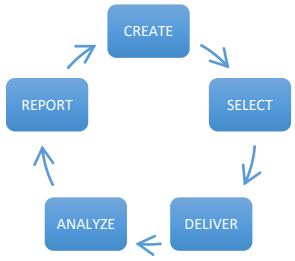

Figure 1: Questionmark Perception collaborative question bank creation, item selection for assessment, scheduled delivery, post assessment analysis and reporting loop.

The Questionmark Perception licensed software can be divided into three parts. The first part is an offline/online Windows software called Author Manager (version 5.7, 2015). It runs on the Microsoft Windows platform and allows authoring of more than 20 different types of questions, all

collected and stored in local or remote databases called repositories. The second part of QMP is online and involves a dedicated local or remote web server where selected questions for assessments are imported/exported. QMP is then integrated with the LMS, allowing scheduled assessments deployment. Once the assessments have been deployed and delivered to learners, the results are then collected by the third part of QMP. This is the analysis and reporting part. The results data collected can be analyzed and more than 11 different types of statistical reports can be generated. This part is also online by gaining secure access to the QMP web server [9].

Electronic online assessment tools such as QMP have many advantages over traditional paper-based assessments. They save paper and are not limited to time and place. They provide feedback to educators as well as learners. If assessments are limited to algorithm based grading, e.g. multiple choice, multiple answer, true/false and matching questions, the results can be provided almost immediately. Over time, they are also cost and labor effective. However, the initial infrastructure setup may be expensive, and staff and student reluctance or fear of use, stable internet connections and the lack of timely technical support can pose a hindrance to its use [10].

Aim of the Study

To test and tryout the QMP tool with level three medical biochemistry students in the College of Medicine, King Khalid University during semesters I and II (2013/2014). In particular, the tool will be tested to provide analysis on the final theory exam and the items used in assessment according to the college medical education department guidelines.

2. METHODS

QMP was used to prepare the question papers for two exams conducted for level three medical biochemistry students in the medical college during semesters I and II (2013/2014) wherein, 291 students (193 boys and 98 girls) took the exam.

QMP authoring manager was used to collect the required questions for the exam. The offline version of the software was used in order to make sure that questions remain in a private personal computer until such a time when they were needed for the online exam. It also allowed the staff exam committee of the department to discuss each question in detail, amend and edit questions as deemed appropriate. The type of questions for the final exams was multiple choices with one best answer MCQ-1). Selected questions were then used to create the assessment and randomized both in terms of the stem and the choices at the time of delivery. The exams were conducted in two different campuses simultaneously (boys and girls) and were totally online. QMP reporter was used to provide statistical analysis of the questions and student performance.

3. RESULTS

The exams went smoothly without any problems. All students completed the online exams well in time. No offline, on-paper examinations were required. The online electronic exams represented 35% of the total grade. The overall results (continuous assessments and final practical and theory exams) for semester I and II were as follows: Grade A, 24 (8.2%), Grade B (21.0%), Grade C, 100 (34.4%), Grade D, 84 (28.9%), Grade F, 22 (7.6%). QMP questions statistics and item analyses for the two online exams were very similar with most of the questions being easy to moderately difficult (Table 1 & Figure 2) while others were satisfactory, some modifications may be required, or completely revised with respect to item discrimination (Table 2 & Figure 3). The Cronbach's Alpha reliability index was 0.88 for both exams indicating excellent internal consistency [11-13].

Table 1: Number of Question (70) in the various categories of difficulty factor for the two final exams conducted by QMP.

Semester	Easy	Moderate	Difficult
Semester 1	15	53	2
Semester 2	17	48	5

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Table 2: Number of Question in the various categories of recommended discrimination in the two final exams conducted by QMP [14]

		Semester 1		Semester 2	
D Range	**Interpretation**	**Qs in the exam**	**% Discrimination**	**Qs in the exam**	**% Discrimination**
0.4 – 1.0	Satisfactory Discrimination	29	42%	21	30%
0.3 – 0.4	Some revision may be required	18	26%	20	29%
0.2 – 0.3	Need revision	13	18%	13	19%
-1.0 – 0.2	Removed or completely revised	10	14%	16	22%

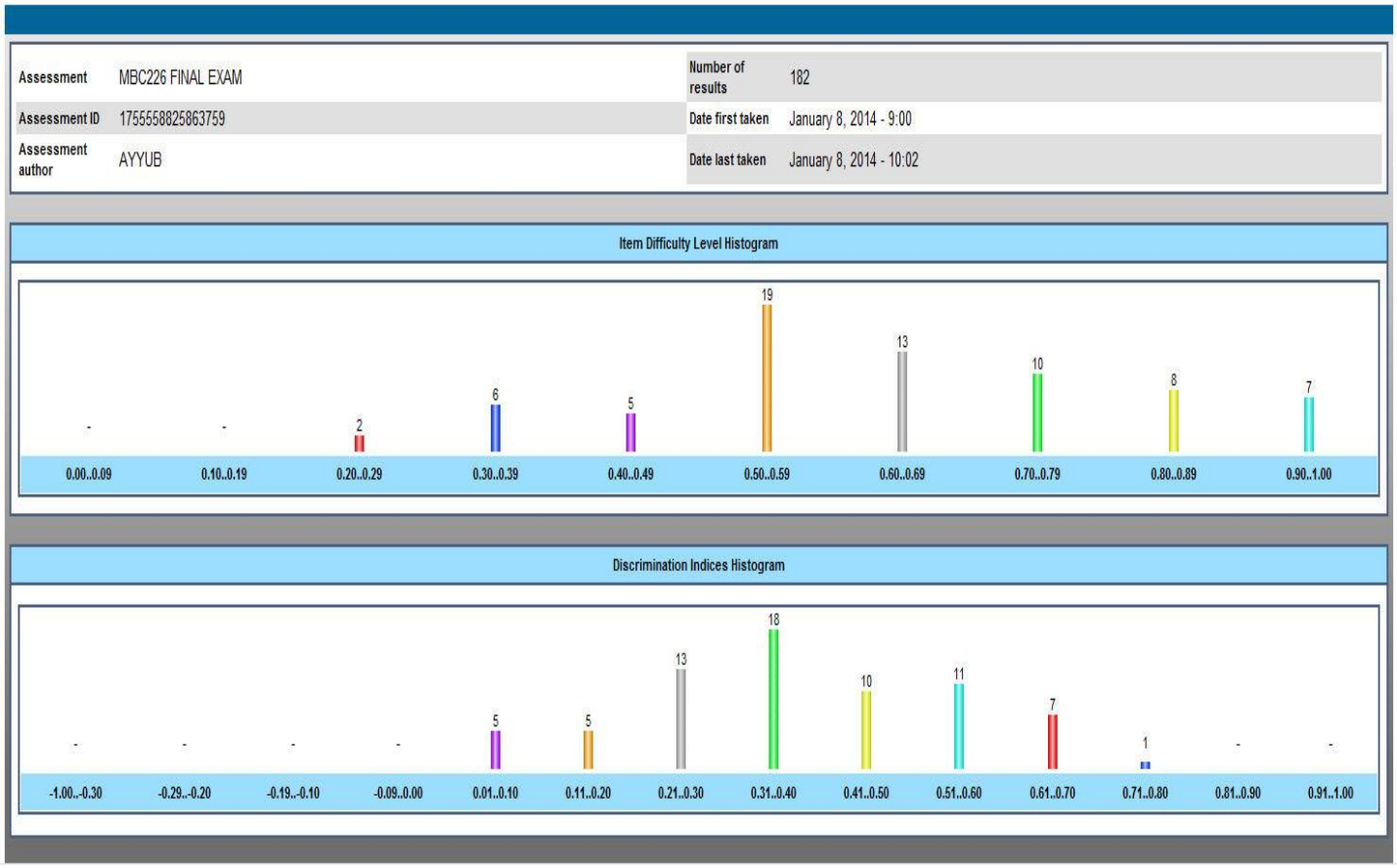

Figure 2: Shows item difficulty and discrimination indices for final theory exam in semester 1 (2013/2014).

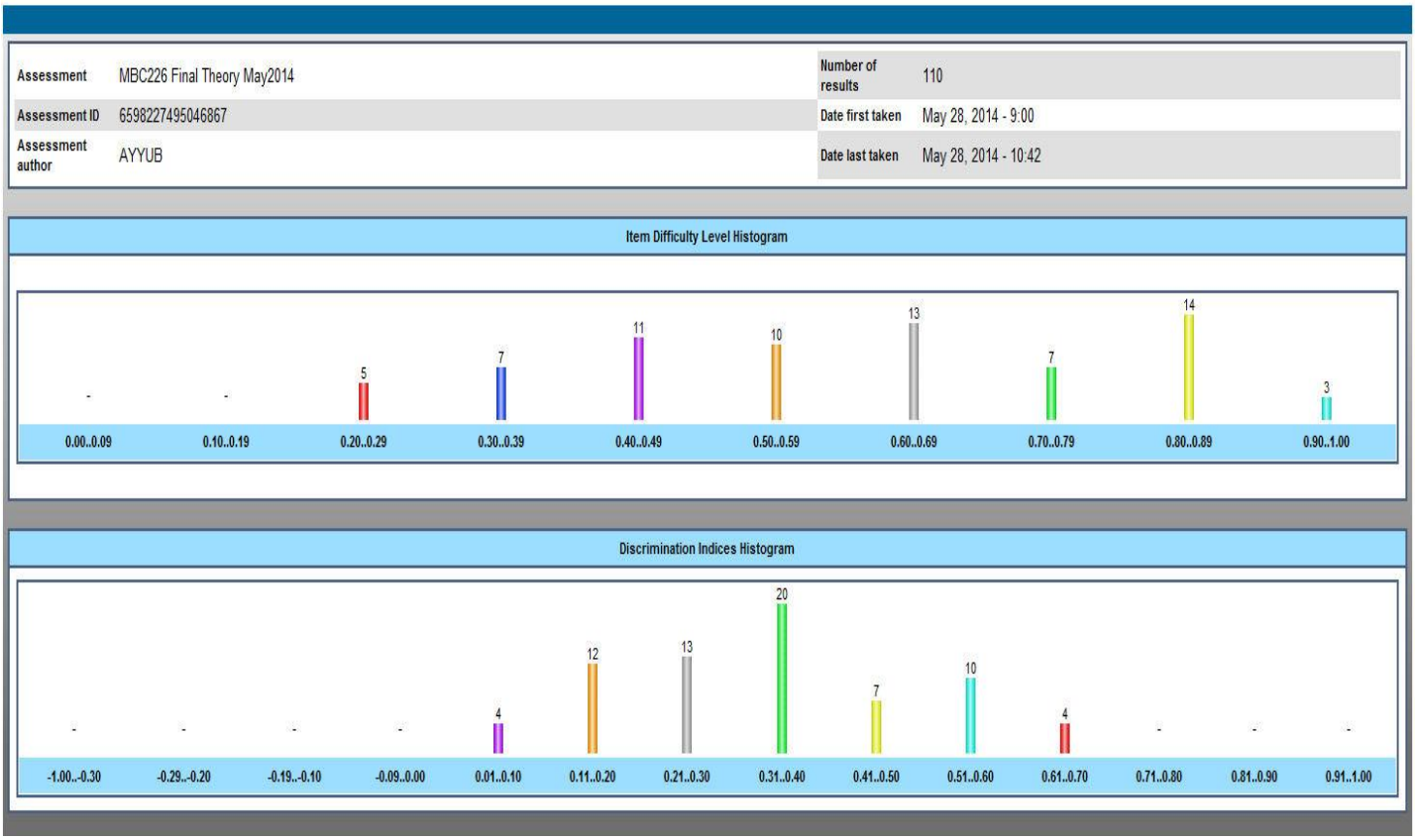

Figure 3: Shows item difficulty and discrimination indices for final theory exam in semester 2 (2013/2014).

4. DISCUSSION AND CONCLUSION:

Questionmark perception (QMP) is a very helpful tool in conducting examinations at university level, either online or offline. It also provides excellent analysis of the questions, feedback, students' performance and reliability of the assessments.

QMP is limited due to the drawbacks that there will be an online student's sense of isolation as they feel more impersonal over the electronic media. In the event of a technical or temporary internet connection failure, students may feel a sense of disruption and distraction [15]. In our university, QMP is mostly used for multiple choice quizzes provided by the software publisher, but these types of assessments lack creativity and may not be suitable to the specific needs of the learners. Creating online tests in QMP may be very tedious and time-consuming [16]. It is not as easy as simply uploading the Microsoft Word version of the test. Instead, instructors have to either copy and paste each question's text and each individual answer's text into the application, mark the correct answers, and customize feedback and setting options or modify the Microsoft Word file using the format required for import into QMP. Moreover, some students may not be accustomed to taking quizzes and tests online, and they may need some hand-holding early in the semester before they feel comfortable with the technology. Cheating on an online test is as simple as opening up another window and searching Google or asking a classmate for the correct answers. Furthermore, cheating on online multiple choice tests is near impossible for the instructor to prevent or catch without technical knowledge. The software developers have introduced security measures to prevent such cheating though the technology that makes online tests possible is a great thing, but can also cause problems. If we do online testing, we should have a back-up plan for students who have technical difficulties and be ready to field some frantic emails from students who have poor internet connections or faulty computers [17].

Despite the drawbacks listed here, there are some definite advantages to online testing. Although creating online tests is labor-intensive, once a test is developed in QMP, it is relatively easy to transfer it and repeat it in other courses. It allows for a high degree of customization in the feedback students get in response to each answer that they submit. As an instructor, one could leverage this tool as another way to engage with students about course content. Online tests are asynchronous and can be accessed on a variety of devices. If students buy the mobile app, they can even take a test from their smartphone. The flexibility offered by online testing can be a great solution for learners with busy schedules or when unexpected class cancellations occur. While it is hard to prevent cheating, online tests do offer many settings for instructors to randomize questions, impose test taking time limits, and restrict attempts. Testing in an online environment can be a lot more interactive than traditional paper and pen tests. Instructors can embed multimedia in test questions to provide more engaging assessments [18]. For example, students may be asked to identify a particular area of an image by directly clicking on it instead of having to answer in written form. In all likelihood, students are already using online tools as study aids for their courses. Instructors can better serve students by providing them with custom made study aids like online practice tests, rather than entrusting students to rely on outside resources that may not be valid sources of information. For objective question types like multiple-choice, QMP will automatically grade student responses, saving time for the instructor and providing more immediate feedback to students. Online tests can be more accessible to students with disabilities who have assistive technologies built into their computers than hand written tests are [19].

Given the advantages and disadvantages of online testing, there are some practical tips for applying this tool. One must be sure to introduce online tests (and any other new learning technologies in general) to students early in the semester to reduce technical issues and build desired study habits among them. Using online tests as ungraded practice tests or low stake assignments will provide a useful self-check tool for students and greatly reduce concerns about cheating. Another way to avoid the cheating issue is to design online tests to be open book assessments with a time limit. Online tests can address student demands for exam study guides. Students must be provided with an online practice test a few days before a traditional exam, and this practice test must be similar to the real thing [20]. If students are struggling with a particular concept and a need for formative assessment occurs, apply online quizzes as a just in time assessment to help identify areas where extra practice is needed. Staff should also try using online pre- and post- tests as a way to measure student learning over the course of a curricular unit. This approach is especially useful for competency-based learning models that focus on mastery of skills over time spent learning.

The statistical analysis in our study, however, highlights a few concerns. As per this analysis, about 35 to 40% of the questions in the exam fall in the discrimination range which needs item revision and / or item removal. But as QMP is designed for the purpose of various exams including competitive exams, the consensus is that our exam being for undergraduates, targeted towards assessing the understanding of the subject matter by the student and not creating any competition between students (as is done in some entrance exams), a discrimination index of up to 40% is acceptable. If this index is low, many students will fail to pass through the exam. Traditionally, an undergraduate medical exam should evaluate a student's knowledge upto 35 % and if he can recognize the subject, at least up to 35% of the questions asked, he is deemed to be aware of the concept and the theme under study. Thus, he should be given a chance to further continue with the study of the topic. Therefore, it is concluded that a university exam can have a discrimination index of up to 40% and so the questions need not be revised nor removed. Off-course, had it been a competitive exam, it is recommended to remove such questions. Here is a suggestion to the team of QMP makers to add another parameter in the statistical analysis giving the option of University exam or competitive exam [21].

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Although current data does not fall within the preview of the recommended discrimination index, it is felt that these exams being an assessment of the level of understanding by undergraduate students and not a competitive exam makes QMP a valid and advantageous tool for assessments in a medical college.

Questionmark Perception version 5.7 is a comprehensive wide ranging assessment system with many features useful in most subjects and institutions. However, for medicine-based subjects, there is no automatic marking of anatomical, surgical or equivalent answers. Random parameters are not used. The authoring of questions is particularly straightforward using the wizard. However, there is more scope for customization and author control. The tryout feature for a question before inclusion in a test is invaluable. Feedback provision is excellent. The tagging of questions gives flexibility in test construction. The support offered is extensive through manuals and online. The report system provides in depth academic and statistical reports [22].

Paper exams also limit the possibilities for questions. Now, rather than having four choices on a multiple choice question one can include as many as nine or ten choices in QMP. Perception also enables staff to include fill-in-the blank questions that can also be automatically scored. Using computerized testing also enables us to randomize the questions. Every student gets the same exam but all of the questions come in a different order. Even the choices are randomized. That makes the tests more secure and greatly reduces the temptation to cheat [23].

Questionmark Perception provides a lot of options that makes creating questions, setting up assessments and seeing the results, very useful. Is it a perfect product? Overall, QMP is a very powerful tool that is relatively easy to use and has a place in any enterprise that is in need of creating and delivering electronic assessments.

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