

# Action research on e-assessment using tools MoodleCloud, QuestBase in mathematics and its impact on assessment for learning on students

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**Abstract-** The traditional mode of teaching and assessing mathematics in Indian schools has made this subject dull and boring for many students. This disinterest could be easily seen among them while assessments. Students who rely mostly on factual domain of cognitive memory, prefer to memorize the things rather than to understand, apply, analyze and evaluate the knowledge. This weakens the reasoning and analytical memory skills of students. With the help of formative and summative assessments a teacher can always evaluate a learner's progress. This research study is comparing and drawing the line of inferences between the techniques of e-assessment of a learning management system (LMS) and the traditional approach of assessment. Here I have tried to figure out the impact of e-assessment on students, and how it is beneficial to them. With help of these e-learning methodologies how well a student can cope up with mathematics concepts and how these e-assessment tools become useful for teachers as well as students. This research paper has stressed upon the use of cloud technique of e-assessment. Assessing and storing data at a cloud platform is always preferable than on a standalone desktop application. This is because in presence of data and network connectivity, cloud servers can be assessed anytime at anyplace over any medium like smart phones, tablets, desktops or laptops. We just need to have our login credentials with a WiFi network or LAN connectivity so the learning could never get hamper.

**Index Terms-** Cloud technique, e-assessment, Learning Management System (LMS), MoodleCloud, QuestBase

## I. INTRODUCTION

This action research study discusses upon the benefits of e-assessment over any other means of customary assessments used in learning of mathematics. Here I have drawn the inferences with reference to cloud computing websites which are known to store data and produce results on clouds without actively depending upon server-client machine interaction. In this research paper I have chosen the cloud servers of MoodleCloud.com<sup>[1]</sup> and QuestBase.com<sup>[2]</sup>. MoodleCloud<sup>[3]</sup> is web-service version of Moodle<sup>[4]</sup> developed to significantly to host Moodle courses and Moodle mobile app. This cloud version has now made Moodle (The Standalone application in past) to get configure easily on web servers. Teachers and students can now easily communicate at any place, any point of time through their smart phones, tablets, laptops or desktops on these LMS. The best part is, the assessment can be easily conducted irrespective of time and place. Another E-learning tool is QuestBase.com<sup>[5]</sup>. This website is very helpful for teachers in generating tests, quizzes, checklists, rating scales etc. This is purely based upon cloud computing helping the new era generation in grasping the abstract mathematical concepts very easily by generating immediate feedback.

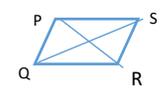
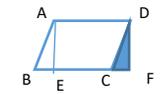
Here I have shown the radical study for learning evaluation on basis of assessment. This has given me the exposure and experience of introducing e-assessment technique for active learning. Which brings the blended learning environment and is found very useful over traditional assessment techniques. To serve this purpose I have designed the assessment quiz tests on basis of revised Anderson's and Krathwohl revised Taxonomy, 2001<sup>[6]</sup> of assessment.

## II. ASSESSMENT - METHODS, TECHNIQUES

As stated by Black, Paul, and Dylan Wiliam, in their book Inside the black box: Raising standards through classroom assessment. Granada Learning, 2006, "The 'assessment' includes all those activities undertaken by teachers, and by their students in assessing themselves, which provide information to be used as feedback to modify the teaching and learning activities in which they are engaged"<sup>[7]</sup>. Also as stated by Angelo, Thomas A., and K. Patricia Cross, "Classroom Assessment is an approach designed to help teachers find out what students are learning in the classroom and how well they are learning it"<sup>[8]</sup>. Thus following the Anderson's and Krathwohl Taxonomy Model, 2001 of cognitive domain for assessment in mathematics. Teacher needs to design the formative assessment to check student's progress based upon the structure of knowledge dimensions. To serve this purpose the table of

Anderson’s and Krathwohl Taxonomy Model<sup>[4]</sup> can be constructed (see Table I). This is with respect to interactive tool from the Iowa State University<sup>[9]</sup> provides some cross-disciplinary examples of what Anderson and Krathwohl’s taxonomy means in practice (Iowa State University, n.d.).

Table I: Anderson’s and Krathwohl Taxonomy for assessment in mathematics for topic quadrilaterals

		Cognitive Domain					
		Remember	Understand	Apply	Analyze	Evaluate	Create
Knowledge Dimension	Factual Knowledge	Definition and types of quadrilateral. Example : A Parallelogram	A quadrilateral with opposite sides parallel is called a parallelogram .	The opposite sides, angles of a parallelogram are congruent.	Diagonals of a parallelogram bisect each other.	 <p><math>m\angle Q = m\angle S</math></p> <p>Measure of opposite angles are congruent.</p>	The knowledge of quadrilateral parallelogram is created to solve real life problems.
	Conceptual Knowledge	Formula for the area of a parallelogram.	How can we find area of a given parallelogram ? Area of square or Area of rectangle could be used to serve this purpose ?	Taking a piece of paper in the shape of parallelogram. Checking if it can form a rectangle?	The area of a parallelogram can be determined by first calculating the height of a right angled triangle and then estimating the area of a rectangle.	 <p>The area of rectangle = <math>l(AD) \times l(DF)</math></p> <p>Hence, the area of a parallelogram = <math>l(AD) \times l(DF)</math></p>	The knowledge created <b>area of a parallelogram = base x height</b>
	Procedural Knowledge	Remember the formula of parallelogram	How to apply the knowledge of formulas to estimate area.	Applied the formula knowledge of quadrilateral.	Analyze the different forms of quadrilateral and apply the required formula.	Calculate the result and evaluate it with real life problems solution.	The knowledge to solve any situation problem at given point of time.
	Meta-Cognitive Knowledge	Remembrance about knowledge of quadrilateral.	The concept of quadrilateral and related formulas.	Applying the understood knowledge at given problem.	Analyzing the situation best fits with understanding .	Final estimate of applied knowledge evaluated.	The concept of quadrilateral as whole is created.

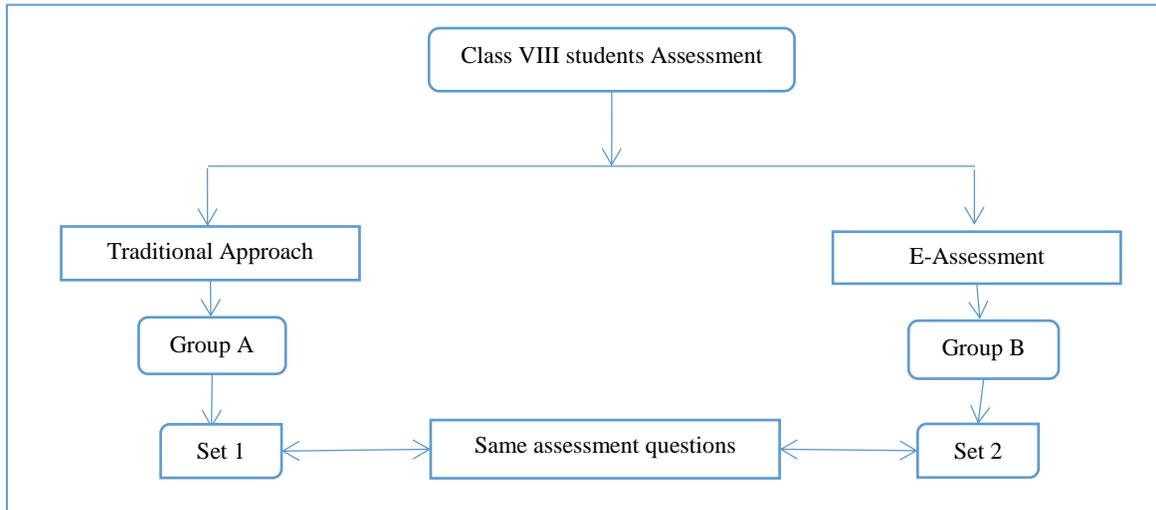
Thus on basis of above taxonomy for assessment, I have conducted two sets of assessments where I have divided the class VIII of 60 students into two groups. Group A and Group B of students. I have designed two sets of assessments with same set of questions. Set 1 of customary class test method on hard copies or printed test papers. Set 2 using cloud assessment tool. Again Set 2 has been divided into two subsets where, Set X of 15 students (Group B) assessed on MoodleCloud.com and Set Y of 15 students (Group B) assessed on QuestBase.com. The whole was conducted on two phases of assessments, Phase 1 of Test 1 and Phase 2 of Test 2 for formative

assessment in Sets A, Set B  $\supseteq$  X, Y. We have given students two-day time to self-assess, review and work upon weaker areas. After these phases of formative assessments, a summative assessment of Test 1 and Test 2 was conducted on both Groups A, B as a whole to compare and conclude the final statistics of traditional and e-assessment approaches.

### III. RESEARCH STUDIES AND FINDINGS

Here is the findings for the qualitative research conducted on class VIII students. At first depicting the flow (Figure I) of assessment. Followed by the graph representation of average results scored.

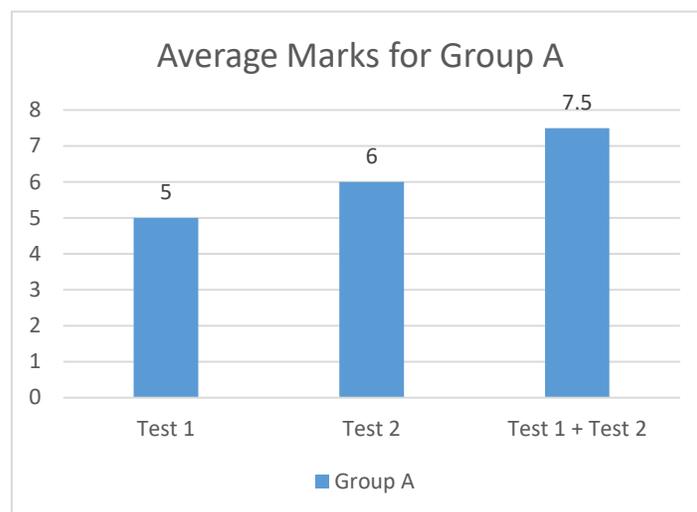
Figure I: Flow of assessment



#### A. Custom approach of assessment - Group A

In this approach we have taken assessment for Group A of 30 students in customary traditional approach of handouts of test papers. At first we have taken Test 1 at the beginning of class period, and provided them results at the end of class period. Given two days' time and conducted Test 2 with some different sets of question this time. Again after two days we conducted a summative assessment of Test1 and Test 2 and got this result, this is depicted in form of bar chart (Chart I).

Chart I: The average marks for topic quadrilateral in mathematics obtained after assessment using test papers



*B. Use of Simulation software - E-Assessment using MoodleCloud and QuestBase Cloud Servers.*

We have designed the same set of questions with the help of simulating online software. We created quizzes and conducted this on Group B. For this purpose, taking the technical specifications into consideration. We have opted out of school’s computer laboratory having 20 computers, so this was meeting our requirement to conduct online exam of 15 students of Set X,  $Y \subseteq$  Set B. Secondly we make sure that each of the PCs were having internet connectivity. Again taking the consideration of load shedding we have chosen the morning hours timing for our e-assessment. Here is the result of our finding.

Figure II: Data flow for E-Assessment

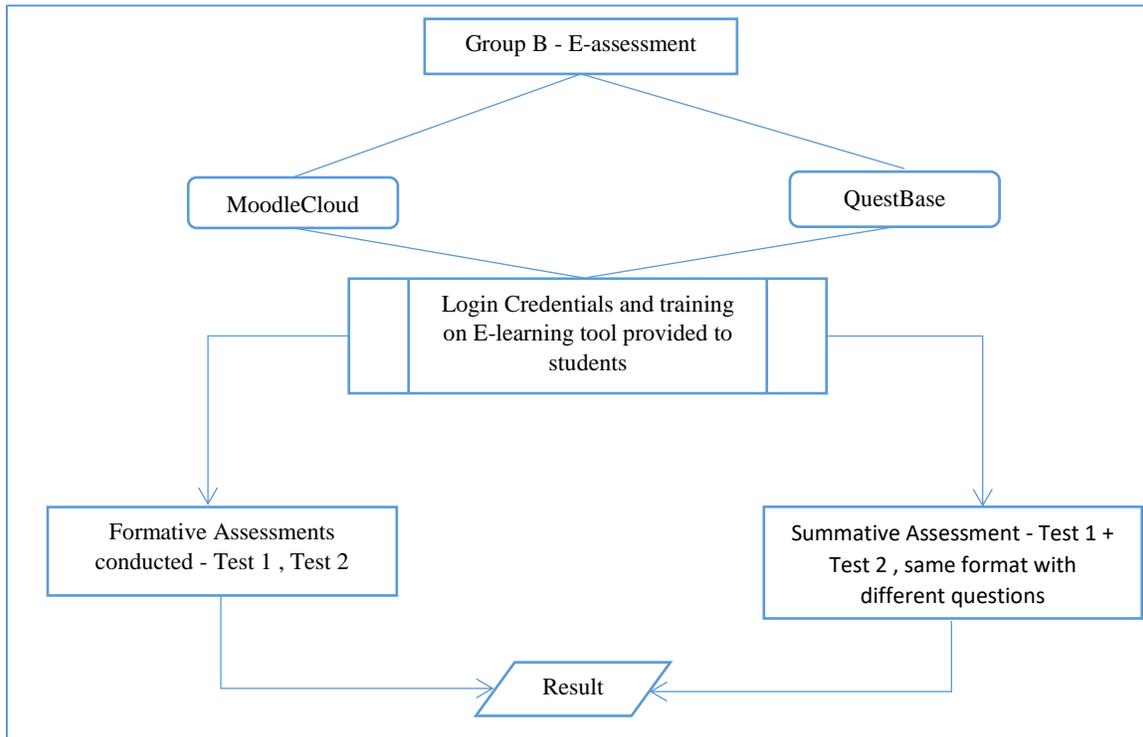
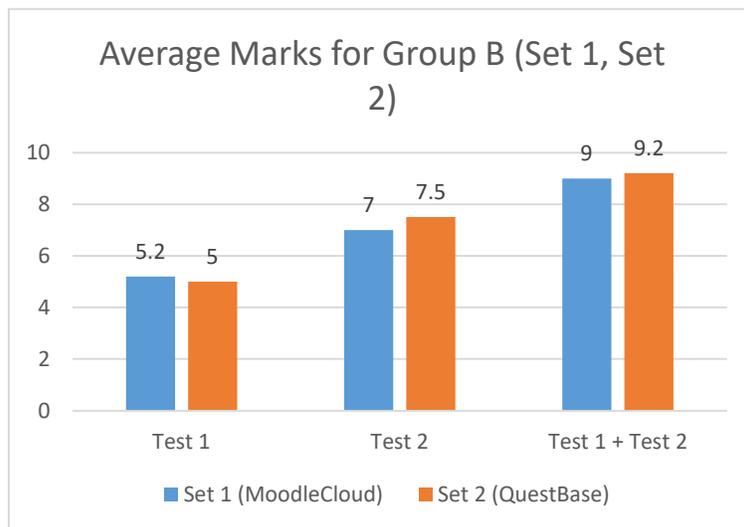


Chart II: The average marks for Set 1, Set 2 for Group B conducted with e-assessment.



*C. Impact of e-assessment on students with respect to our action research:*

Table II is given below briefing about some of the important highlights of this research. Here I have shown the possible outcomes obtained with specification parameters.

Table II: Highlights - Specifications of assessment performed on Group A and Group B

Specifications	Group A : Traditional mode of Assessment	Group B : E-assessment with help on online cloud servers MoodleCloud and QuestBase
Credentials	No authentic credentials are given. Students are provided result with their class roll numbers.	Yes, authentic credentials are given. Teacher first creates their admin account, and with that they can add students, and provide them with their respective usernames and passwords.
Time Constraint	Subjective questions are subjected for steps marking. Hence writing involved time constraint for students.	Objective questions were part of assessment, students were able to complete test on time, some of the students lacking concepts faced difficulty in solving problems.
Copy Attempt	Yes. Copy attempt was seen among students, by peeping other answer copies and open book cheating.	No. As students were given shuffled objective questions and were restricted with their computer monitors.
Test Result	Test results are not provided same time, as it depends upon the examiner to correct the answer copies in a time framework. Also sometimes the correction is influenced by other factors like events organized at school, health factor, work commitment etc.	Immediate test result is provided to the student after successful timely completion of test. This happens because the result is produced on the basis of pre-fetched marks for the question on the online server to calculate for correct response. It is independent of examiner and other factors.
Feedback to students	Teachers can provide feedback to students once the result is declared. Where students can clarify their doubts and interrogate with teacher.	Immediate feedback is provided to the students. One advantage here is that students are doing self-assessment of provided feedback. They can go through the attempted questions and check if their responses against marked questions were correct or not.
Accessibility to completed tests.	Students can access the test paper, only if they have provided handouts of test paper and answer copies along with them.	Students can access the completed papers at any time and from anywhere. As their notes, tutorial videos, attempted quizzes are present on cloud server. Thus in presence of network connection or WiFi student can anytime access to completed tests.
Concept clarity	Students are having opportunity to discuss the concepts with teachers face to face, thus concepts clarity is seen more and better <sup>[11]</sup> .	Concepts were found less clear with backward learners. Where it was seen that gifted learners were good at understanding concepts, but backward learners due to lack of doubt solving with peers and teachers found less apt with mathematical concepts.
Self Confidence	Students have shown substantial growth in self confidence after each formative assessment.	Students have exponential growth in self-confidence, they were found more confident after every formative assessment.
Re-Usability of test	The tests are conducted on hard copies, these hard copies after tests are of no use to be used second time. Thus it is	These tests or quizzes are created online with help of <b>datasets</b> . These datasets are <b>dynamic</b>

	not reusable. Here we can also see the wastage of lots of paper.	in nature and generate random numbers at run time. Hence the examiner whenever require can change the inputs, and pattern of the quizzes.
Summative Assessment Result	Substantial increase in performance rate is seen among students.	Exponential increase in performance rate is seen among students.

#### IV. CONCLUSION

In this research paper I have conducted an action research to present an analytical study between traditional assessment and e-assessment in mathematics. While doing my study on the group of students, I found that e-assessment approach in mathematics was very helpful to teachers and students. I found that in first assessment only pupil get to know about their weakness, they were able to check their results, the quiz and the questions from anywhere. The dependency on the schools were minimal. In second assessment the class who had appear before for e-assessment has shown much better results than the students who had appeared for customary assessment. In final summative assessment, it was found that students who were exposed and trained on E-learning LMS platform bring better results than others. Finally, I would conclude that use of any e-assessment tool<sup>[13]</sup> is always a better option of assessment in mathematics. It provides a teachers learning and reusability of using the set of tests. Also it is very efficient and helps in time management.

#### APPENDIX

Keywords		
1	Learning Management Systems (LMS)	From Wikipedia, the free encyclopedia : A learning management system (LMS) is a software application for the administration, documentation, tracking, reporting and delivery of electronic educational technology (also called e-learning) courses or training programs.
2	Moodle	Moodle is an open source software serving as an E-learning tool at schools, universities and other work places. It is getting used widely for distance learning, virtual classrooms and blended learning.
3	QuestBase <sup>[5]</sup>	As per Fuentes, J. M., García, A. I., Ramírez-Gómez, Á., & Ayuga, F. COMPUTER-BASED TOOLS FOR THE ASSESSMENT OF LEARNING PROCESSES IN HIGHER EDUCATION: A COMPARATIVE ANALYSIS, "QuestBase is a free, cross-platform application to create and manage assessments, tests, quizzes and exams, both on-line and printed."

#### REFERENCES

- [1] <https://moodlecloud.com/en/>
- [2] <http://www.questbase.com/>
- [3] "MoodleCloud • Learning Software Hosted in Cloud • Moodle". Moodle.com. Retrieved 2016-03-25.
- [4] <http://encyclopedia2.thefreedictionary.com/Moodle>
- [5] Fuentes, J. M., et al. "COMPUTER-BASED TOOLS FOR THE ASSESSMENT OF LEARNING PROCESSES IN HIGHER EDUCATION: A COMPARATIVE ANALYSIS."
- [6] Anderson, L. W., & Krathwohl, D. R. (eds.) (2001). A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives. New York: Longman.
- [7] Black, Paul, and Dylan Wiliam. Inside the black box: Raising standards through classroom assessment. Granada Learning, 2006.
- [8] Angelo, Thomas A., and K. Patricia Cross. "Classroom assessment techniques: A handbookfor college teachers." San Francisco: Jossey-Bass (1993).
- [9] Anderson, Lorin W., David R. Krathwohl, and Benjamin Samuel Bloom. A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives. Allyn & Bacon, 2001.
- [10] Rickel, Terri M. "A Fireworks Display of Library Instruction." (2016).
- [11] Heppen, Jessica, et al. "The Struggle to Pass Algebra I in Urban High Schools: Online vs. Face-to-Face Credit Recovery for At-Risk Students." (2013).
- [12] Kapur, K. "Assessment for Improving Learning in Schools in India: A perspective." Retrived from [http://www.iaea.info/documents/paper\\_2b71209fa.pdf](http://www.iaea.info/documents/paper_2b71209fa.pdf) (2008).
- [13] Fuentes-Pardo, J. M., et al. "COMPUTER-BASED TOOLS FOR THE ASSESSMENT OF LEARNING PROCESSES IN HIGHER EDUCATION: A COMPARATIVE ANALYSIS." INTED2014 Proceedings (2014): 976-984.

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