

## “A STUDY OF MOODLE : OPEN SOURCE LEARNING MANAGEMENT SYSTEM WITH REFERENCE TO IT’S APPLICATION IN TEST / EXAM MANAGEMENT”

PROF. SHEETAL UPLENCHWAR  
ASSISTANT PROFESSOR,  
AIMS, PUNE

### I. INTRODUCTION

The first experiment of conducting quizzes using Moodle, an Open Source Learning Management System has been carried out at MCE Society's Allana Institute of Management Science for MCA and MCM course. Both the courses are approved by AICTE and UGC. MCA course is of 3 years having two semesters each year. Each semester has six subjects whereas MCM is of 2 years having two semesters each year. Each semester has five subjects.

Moodle offers a wide variety of teaching tools [1, 3]. One of these tools is quiz module. Quiz module represents an alternative to traditional face-to-face courses and paper-based testing.

The aim was to elaborate power of Moodle quiz, to make use of Moodle question pools and to design, implement and assess a series of quizzes.

The purpose of this study, therefore, was to examine the quality of our MCA (II & III) and MCM (II) multi disciplinary true/false-type, MCQ tests, and to see if there was any relationship between the item difficulty index and the item discrimination index values in these MCQ tests.

### II. LITERATURE REVIEW

Psychometric analysis is formal, structured exercises designed by psychologists to measure psychological qualities such as reasoning ability and personality factors. [4]

Prof. John Rust [5] recommended that Psychometric analysis needs to be carefully researched and tested to ensure that they are fair, reliable and valid, allowing results to be compared with people who have taken the tests before.

According to McHenry [6] companies spend millions of pounds a year on psychometric tests to measure personality types, learning styles and the personal preferences of their employees. His study states that the value of psychometric tests sold every year to UK organizations is more than £20 million and that in 2003 they were used in most of the public sector.

According to Zemke. R. [7], in the United States, the value of sales of psychometric tests and inventories for recruitment, team and personal development is in excess of 100 million US dollars per year.

McCann. J. [8] has suggested use of Psychometric tests in the growing arena of offender profiling and forensic science. He has also suggested psychometric tests can be used for classification of types of offender.

Hardingham, A and et. al [9] have used Psychometric tests in coaching. They described positive impact of psychometric tests for starting a coaching conversation and understanding differences.

In UK psychometric test has been conducted for recruitment process of train drivers. They used psychometric tests for Training and development, Post trauma counseling, Pre-incident counseling, Post incident investigation. [10]

Study reveals that test use in the first two of these was sensible and conforms to good practice whereas it caused problem in pre-incident counseling and post incident investigation. [10].

### III. NEED OF PSYCHOMETRIC TESTING

It is difficult to predict a description of teaching that does not accord assessment as an essential role. Teachers need to continually collect, synthesize, and interpret information about their students' learning, state of knowledge and skills before they can begin to plan instruction.

According to Airasian and et. al [11] as instruction proceeds, it is necessary to collect evidence to reach to conclusion that whether students are learning or not. This evidence is based on teachers' own observations and monitoring of students in the classroom.

These evidences are used for a variety of purposes like to plan future instruction; to adapt teaching to learning styles,

skills, interests, and motivations of students; to provide feedback and incentives; to place students in instructional groups; and to diagnose problems that students may be experiencing.

Black & Wiliam [12] have conducted research in examining how the assessment capacity of teachers might be enhanced to improve student learning. They suggested approach to shift teacher dependence for assessment information and standardized tests should be based on psychometric models.

### IV. PSYCHOMETRIC TEST CONSTRUCTION

Psychometric tests are used to describe the domain or construct, to check ability, body of knowledge, set of skills.

Bloom [13] has recommended requirement in the construction of a psychometric tests, should involve a review of curriculum documents, instructional materials, and textbooks. This review process enables to represent the domain in the form of table specifications or a blueprint.

Bloom [13] have suggested that it is extremely important that the tasks/questions selected for the test need to acquire curriculum area, even if test contains only a small sample of the knowledge and skills.

According to Ferrao[15], the e-assessment system provide a set of tools to analyze the reliability of the tests and, consequently, to ensure the quality of the system.

Psychometric analysis is a great tool for assessing whether the quizzes are a reliable instrument for measuring the students' performance, attitudes and abilities. So all test must provide an adequate representation of the curriculum. Otherwise, it is not possible to predict student's performance if it is based on the test.

Rust and et. al [14] have suggested principles of psychometric study like Reliability -freedom from error, Validity, Standardization, Equivalence.

### V. RESEARCH METHODOLOGY

This research work focuses on to analyze students' answers, to carry out a psychometric analysis i.e. measurement of knowledge, abilities, attitudes, and to identify the appropriateness of the questions stated in the quizzes.

This pilot study focuses on the set of Moodle's quiz module.

Moodle's quiz module have several types of questions like multiple-choice questions, true/false, short-answer questions, numerical questions, matching questions and embedded answer questions. The GIFT format was used for the creation of quiz.

### PRIMARY DATA

With reference to above line, we carried out experiment at Allana Institute of Management Sciences for MCA course, The quiz was conducted for MCA (II Year - Semester III) and MCA (III Year - Semester V) for each subject.

### SAMPLE SIZE

Semester wise and subject wise total number of students those who have appeared for test are given in the table below.

**TABLE 1 : STATISTICS OF QUESTIONS AND QUESTION TYPES FOR MCA-III (SEMESTER- V)**

Subject Name	Question Types / Total no. of questions asked				
	MCQ	T/F	Descriptive	Numerical	Total. No Attended Students
Software Project Management	25	25	NIL	NIL	54
Human Computer Interface	38	22	NIL	NIL	53
Application Development Tech	57	NIL	NIL	NIL	66
Emerging Trends in Information Tech	48	1	NIL	NIL	66
Programming Language Paradigm	20	NIL	NIL	NIL	60
Advance Internet Technology	41	5	NIL	NIL	66
Advance Unix	NIL	NIL	NIL	13	5

**TABLE 2: STATISTICS OF QUESTIONS AND QUESTION TYPES FOR MCA-III (SEMESTER- V)**

Subject Name	Question Types / Total no. of questions asked				
	MCQ	T/F	Descriptive	Numerical	Total. No Attended Students
Web Support Technologies	42	NIL	NIL	NIL	96
Research Methodology	16	9	NIL	29	78
Data Communication & Network	60	NIL	NIL	NIL	111
Data Structure using C++	43	NIL	NIL	NIL	110
Advance Database Management System	28	31	1	NIL	88
Object Oriented Analysis & Design	57	NIL	NIL	NIL	42

## VI. EXPERIMENTAL RESULTS

Psychometric analysis is carried out with the help of item analysis report which gets generated by Moodle. Item analysis is the process of collecting, summarizing and using information from students' responses to assess the quality of test items. Difficulty index (P) and Discrimination index (D) are two parameters which help evaluate the standard of MCQ questions used in an examination.

It has attributes like question type, question name, question text, partial credit, R count, R%, Correct facility, Discriminative Index. The Definition of the attributes are given in the table below :

**TABLE 3: ITEM ANALYSIS ATTRIBUTES**

Term	Description	Example
Partial Count	Credit that student receives for the attempted question.	Correct Ans : Assigned credit Incorrect Ans : 0
R Count	Total No. of students those who have selected specified response.	Specified as n/m. e.g. 10/15. Out of 15 students, 10 students have selected given response.
R%	It is $n/m \times 100$	If R count is 10/15, then R% is 67%.
Correct Facility / Facility / Difficulty Index(FI/P)	Percentage of the total group who have responded correctly to the item.	Out of 15 students, if 10 students has answered correctly the FI = 67%.
Discrimination index (d)	Difference between the percent of correct responses in the upper group and the percent of correct responses in the lower group.	$D = (UG - LG) / n$

The Table below shows value of Facility index / Difficulty Index F (or Software Project Management System(SPM) subject.

**TABLE 4: STATISTICS OF FACILITY INDEX AND DISCRIMINATION INDEX FOR SPM**

Range of Facility Index/ Difficulty Index	Total No. of Questions	Facility Index/ Difficulty Index Level	Discrimination Value	Total No. of Questions	Discrimination Level
$\leq 30$	16	High (difficult)	Negative Values	3	Miskeyed question/ ambiguous question / confused question.
$> 30$ and $< 80$	38	Moderate	0 to 0.2	16	Not Discriminating well
$\geq 80$	43	Low	0.4 and above	63	Good discrimination

It is observed from the table that only 16 questions and 3 questions were mistyped or may be ambiguous.

## CONCLUSION

Moodle quizzes can be considered as a convenient and interesting tool to inform students of their performance throughout the learning process. From this first and positive experience regarding the use of the Moodle quiz module, we intend to generate improved quizzes suitable enough for assessing the teaching and learning of the subject.

Moodle quizzes also help to reduce various tasks like supervision of examination, checking of question papers and unbiased checking and also help teachers to organize, manage and deliver course material.

MCQ items that demonstrate good discrimination tend to be in the moderately easy to moderately difficult. range. On the other hand, items that are in the moderately difficult to very difficult range are more likely to show negative discrimination. The wide scatter of discrimination needs further investigation, and before we discard an MCQ for poor discrimination, we must first look into the factor(s) that may contribute to such poor discrimination.

## REFERENCES

- [1] Paul Kavangh, "Open Source Software Implementation & Management", Elsevier Digital Press, 2004, ISBN: 1-55558-320-2.
- [2] Moodle Statistics, "<https://moodle.org/stats/>", last accessed on 24<sup>th</sup> Aug 2013.
- [3] Cole, J. (2005), "Using Moodle's teaching with the popular open source course management system", Sebastopol (CA): O'Reilly Community Press.
- [4] Psychometric Analysis, "<http://www.hw.ac.uk/careers/info/psychometric.pdf>", last accessed on 19<sup>th</sup> Aug 2013.
- [5] Prof John Rust, "Psychometrics in Context: Test Construction", University of Cambridge, The Psychometric Center, last accessed on 23<sup>rd</sup> Aug 2013.
- [6] McHenry, Dr. R. (2003), "How to use psychometrics effectively", <http://www.opp.eu.com/public/media/pdfs/Using%20psychometric%20tools%20effectively.pdf>", last accessed on 18<sup>th</sup> Aug 2013.
- [7] Zemke, R. (1992), 'Second thoughts about the MBTI', Training, April 1992, v29, n4, 43-48, last accessed on 18<sup>th</sup> Aug 2013.
- [8] McCann, J. (1992), 'Criminal Personality Profiling in the Investigation of Violent Crime: Recent Advance and Future Directions', Behavioral Sciences and the Law, Vol. 10, 475-481.
- [9] Hardingham and et.al. (2004), "The Coach's Coach: Personal Development for Personal Developers", London: CIPD.
- [10] Psychometric Testing - A review of the train driver selection process, "[http://www.rsb.co.uk/SiteCollectionDocuments/pdf/reports/Research/T340\\_rpt\\_final.pdf](http://www.rsb.co.uk/SiteCollectionDocuments/pdf/reports/Research/T340_rpt_final.pdf)", last accessed on 17<sup>th</sup> Aug. 2013.
- [11] Airasian, P.W., Kellaghan, T., Madaus, G.F., & Pedulla, J.J. (1977), "Proportion and direction of teacher rating changes of students progress attributable to standardized test information.", Journal of Educational Psychology, 69, 702-709.
- [12] Black, P and et.al (1998), "Assessment and classroom learning .Assessment in Education," 5, 7-74.
- [13] Bloom, B.S. (1969), "Some theoretical issues relating to educational evaluation: New rules, new means". 68 Yearbook of the National Society for the Study of Education, Part II. Chicago: NSSE.
- [14] Rust, J. & Golombok, S. (2009), "Modern Psychometrics (3rd Edition): Taylor and Francis: London".
- [15] Ferrao, M. (2010). "E-assessment within the Bologna paradigm: evidence from Portugal". Assessment & Evaluation in Higher Education. vol. 35, no 7, pages 819-830.