

A Research Paper on Simulation Model for Teaching and Learning Process in Higher Education

S. S. Rai¹, Anil T. Gaikwad², R.V. Kulkarni³

Abstract

The Research paper entitled above gives trace on Simulation Model for Teaching and Learning. This is the important area in which the teaching and learning can be benefited. The teaching methods involve three types of methods like lecturing method; Computer based teaching method and mixed teaching methods. The researcher has studied the methods used by teachers and method preferred by the students they have also returned the rules to find out the quality of the teaching and learning. The results are found by Chi. Square test for the teaching and learning methods. The respondents taken for the study were 100 teachers and students were 100. The final results are very surprising and it suggests using both Computers based and lecturing method of teaching learning process. The simulation model is designed by the researcher to find out the best method of the teaching and learning process in higher education. The main objective of the paper is to trace on the best method of the teaching and learning so that the output of the teaching method is improved and students are benefited by this. The objectives of this paper are to study various types of teaching and learning methods used by higher educational Institutes, study the ideas and the best way of teaching suggested by expert teachers, to study the ideas of students who are good in learning and to develop a simulation model and verify using 100 examples for teaching and learning.

Keywords

Rule based System, Quality, higher education, expert system, Chi Square Test, Teaching Methods.

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S. S. Rai Assistant Professor, Department of Computer Applications, Bharati Vidyapeeth Deemed University, Pune Institute of Management, Kolhapur.

Anil T. Gaikwad Associate Professor Department of Computer Applications Bharati Vidyapeeth Deemed University, Pune. Institute of Management, Kolhapur –Maharashtra.

R. V. Kulkarni Professor and Head (Research Guide) Department of Computer Studies Chh. Shahu Institute of Business Education and Research (SIBER) Kolhapur-Mah.-India.

1. Introduction

The motive of the research is to enhance the quality of teaching learning process in higher educational institutes. The researcher proposes the role of knowledge base system and simulation technique to achieve the objective. Teaching and learning process is the methodology of various types of techniques of teaching and learning which is being used by teachers as well as students in the Education. Continuous quality improvement was originally based on the quality assurance (QA) paradigm. Teaching experiences in colleges have shown that Quality Assurance programs are based on knowledge base system technology.

Simulation is the imitation of some real thing, state of affairs, or process. The act of simulating something generally entails representing certain key characteristics or behaviours of a selected physical or abstract system. The proposed knowledge based system is intended to supplement, but not replace, traditional teaching and learning techniques such as lectures and laboratory sessions. This knowledge base system will present an analysis of teaching and learning quality improvement.

2. Objective of the study

In present research endeavour entitled above, the objectives have been considered as follows.

1. To study the various types of teaching methodology used in higher education.
2. To study the ideas and the best way of teaching suggested by expert teachers.
3. To study the ideas of students who are good in learning.
4. To develop a simulation model and verify using 100 examples for teaching and learning.

3. Scope of the study

To acquire the knowledge from expert teachers and develop a rule based system and simulation model for teaching and learning process. Such type of system can be used in analysis of teaching and learning

process in any institute for improving the quality of teaching and learning by using rule based (IF-THEN) format and can also be able to produce analysis of teaching and learning process of the institute.

4. Methodology of the study

The present study has been completed using field survey method, in the field survey method the researcher has approached institutes of Kolhapur and collected method of teaching from teachers and students. Statistical methods are used to analyse the data for the students and teachers under study [7].

5. What is Simulation?

Simulation is the imitation of the operation of a real-world process or system over time. The act of simulating something first requires that a model be developed; this model represents the key characteristics or behaviors of the selected physical or abstract system or process. The model represents the system itself, whereas the simulation represents the operation of the system over time [1]. Simulation is a particular type of modeling, building a model is well recognized way of understanding the world; it is a simplification of some structure or a system. On the other hand, it can be a prediction, a substitute for experimental learning [3].

6. Computer Simulation

Computer Simulation is nowadays widely used in business organizations to perform various tasks in the Business process. Computer simulation is the discipline of designing a model of an actual theoretical system, executing it on a digital computer and analyzing the execution output. A simulation model is actually a mathematical model calculating the impact of certain inputs and decisions on outcomes [2].

A computer simulation is an attempt to model a real-life or hypothetical situation on a computer so that it can be studied to see how the system works. By changing variables in the simulation, predictions may be made about the behavior of the system. It is a tool to virtually investigate the behavior of the system under study.

7. Computer science

In computer science, simulation has some specialized meanings: Alan Turing used the term "simulation" to refer to what happens when a universal machine executes a state transition table (in modern terminology, a computer runs a program) that describes the state transitions, inputs and outputs of a subject discrete-state machine. The computer simulates the subject machine. Accordingly, in theoretical computer science the term *simulation* is a relation between state transition systems, useful in the study of operational semantics. Computer Science deals with complex phenomenon of coding the problem with the particular objectives and making the environment real like situation.

8. Simulation in education and training

Simulation is extensively used for educational purposes. It is frequently used by way of adaptive hypermedia. Simulation is often used in the training of civilian and military personnel [3]. The Simulation can be used in the teaching of various subjects in science and other faculties. The various methods of simulations also are used in teaching and learning methods. In this paper the authors have used to find out best method of teaching and learning.

9. Introduction about teaching and learning Method

- 9.1 Introduction:** The teaching and learning are the most important process in education. The best use of student's time and teachers resources will have positive impact on this process. The variety of teaching and learning methods which is used within a course is an important ingredient in creating a course with interest to students. A course with a large proportion of its teaching taking place in lectures will need to have a high level of intrinsic interest to students to keep them engaged. Over the past few years, a wide range of different teaching and learning methods have been introduced and tested to develop the skills of the student's community in the Institutes.
- 9.2 Lecture Method:** Lectures are still the most important and widely used teaching methods in the higher educational Institutes. The advantages and drawbacks are their in this method. The students concentration is not checked in this

methods nor their is participation of students in this method. Fifty-minute lectures remain the core teaching method for most undergraduate courses. Their role is best suited to providing an overview of the subject matter and stimulating interest in it, rather than disseminating facts. Lecturing to large classes is a skill which not all staff has acquired and some are not comfortable in this role, and so, where possible, a course organiser is advised to try to spread the lecturing load so as to favour those staff with best skill at it, although freedom of action in this respect is often limited! All students appreciate good quality lectures.

9.3 Tutorials and Seminars: Tutorials and seminars are also widely used to teach the subjects with more difficulty level in higher educational Institutes. After the lecture, this is probably the next most widely used teaching method. The distinction between what is a tutorial and what is a seminar is woolly - to some it depends upon size (i.e. 'a 20 person group cannot be a tutorial as it is too big and is therefore a seminar') whereas to others the seminar has a different structure (speaker + audience) and different objectives. There is certainly greater divergence for tutorials. Methods, they hold out promise for those courses where students are difficult to bring together or to enable exchanges between face-to-face sessions. The active nature of the tutorial/seminar makes it the main source for students to acquire some of the 'personal transferable skills', e.g. in presentation and group work.

9.4 Laboratory and Practical Classes: The Practical Subjects are supported by Lab work and practical assignments for the students. Thus the subjects properly planned in the course are liked by the students and they are understood in good way. For science subjects, laboratory (lab) work is an essential ingredient of the course and some component of this is generally preserved, even though the amount may fall. In addition to the experience of lab work, students often derive a lot of their contact with staff in the lab setting, and compensation for this may be needed if lab time is significantly reduced. High quality lab work is expensive to provide, and it is important that we are sure that students do indeed gain all that they might from it, especially as the number of students present may have increased.

9.5 Other Teaching Methods: Other methods that may be considered are numerous, including:

- Workbooks, diaries, and lab notebooks;
- Computer-based methods;
- Fieldwork;
- Independent learning tasks;
- Essays, dissertations and projects;
- Library searches;
- Portfolios;
- Posters;
- Videos.

Judicious use of them gives students the chance to use a variety of learning techniques so that each gets one or more which suits them best. If you find a possible method but are unsure how best to introduce it to your course, search out someone who has used it and pick their brains. You will probably find that TLA Centre can point you to such people, even if they may not be in the University of Edinburgh [4].

9.6 Students with Disabilities: The Students with various disabilities also have to be treated with utmost care to give them more knowledge and this will create the interest in these students. The University has growing numbers of students with disabilities (e.g. dyslexia) who may present particular challenges to courses with large numbers of students. For example, a profoundly deaf student may be able to follow a lecture with the help of a sign language interpreter, but will not be able to take notes at the same time. A blind student may need special help with practical sessions. It is not possible to give detailed general advice on making the variety of teaching and learning methods described in.

9.7 Computer Supported Learning: Computer supported learning is also used by students and teachers in the Institutes. The Computer can be used for PowerPoint presentation and database handling. The course organiser's responsibility, in consultation with colleagues contributing to the course, to co-ordinate the availability of resources in the Library (books and reprints in the short-term loan collection) all other aspects of resource-based learning will require forward planning with which the course organiser will have to be involved. Various learning technologies (such as computer and multi-media resources) are increasingly being used in support of the learning process, presenting new challenges and opportunities for staff and students. A major resource being used more frequently is the World Wide Web (WWW) [5].

9.8 Useful Contact Addresses for Technology in Teaching and Learning: The Computers in Teaching Initiative Support Service (CTISS), principally through its various academic subject centres, provides support with the implementation of learning technologies across higher education institutions within the UK. Activities of the various centres differ to some extent, but most run workshops on subject-specific and generic aspects of IT use in teaching, publish a periodic journal or newsletter, and maintain a collection of resource materials in their particular subject domain. CTISS also publishes, twice a year, the major international journal *Active Learning*, which is free to academic staff in all UK higher education institutions. To subscribe, request a subscription form from CTISS through the contact routes listed below. The CTI Support Service can be Computers in Teaching Support Service.

10. Student Assessment

The Students assessment for his various qualities in education system is important and use of the computer system to assess the students' performance will improve the quality of teaching and learning process in the Institutes. Each student will write an answer to one of the questions. This writing will be assessed holistically. The teacher should note grammatical errors on the students' writing, and write the proper spelling of words in the margins. But the teacher's role in the assessment is to encourage the student to develop his/her ideas more. The teacher should write a paragraph asking the student some interesting questions which challenge the student to think a little more carefully about his/her answer [6].

11. Rules for the Simulation

The simulation rules are written by finding the problem domain. The Rules can be written using if then else statements.

11.1 Introduction: Simulation model can be used as a tool in teaching and learning process in various institutes with educational purpose. Simulation model helps in decision making on the basis of conditions entered. Simulation model gives the opportunity to experiment with events and a sense of reality in information science. The simulation model for teaching and learning process. This simulation model is developed on

the basis of data collected by various students and teachers which are being used by various teachers and students in teaching and learning process. On the basis of entered data and the design objectives, syllabus, time and curriculum the outcome of simulation will be presented. The outcome of that simulation model depends upon the teaching methodology used by the teachers and the learning methodology used by the students. The outcome of simulation model can be excellent, very good, good, satisfactory and unsatisfactory for the given teaching and learning process. The simulation model is calculating all the teaching and learning process which is being used by teachers and students. The outcome of the simulation model will be achieved by rule based system which works on the basis of IF and THEN conditions. Teacher's activity will be entered like Experience of the teacher, subject knowledge of the teacher time management of the teacher way of maintaining intelligence level of the students according to their class level, communication skill of the teacher, interaction of the teacher with the student and feedback of all class students about the teacher. In student field the various activities of the students like learning activity of the students, level of the student's use of information technology of the students and active participation of the students and the feedback of the teacher about students. In educational practices interaction of the students and faculty and the feedback of the students and faculty will be entered in design part of the simulation the design of syllabus will be defined and the curriculum of the course will also be entered.

Table 1.0: Table showing teaching methods

Sr.No.	Random Numbers from Excel (observed)	Teaching Method used
1	3	1
2	87	3
3	68	3
4	50	2
5	8	1
6	52	2
7	8	1
8	41	2
9	77	3
10	85	3

On the basis of entered teachers students educational practices and design the outcome will be displayed.

The outcome will follow the rule based system and on the basis of rule based system the decision will be produced. The outcome can be Excellent, very good, good, Satisfactory and unsatisfactory which is producing the result of teaching and learning process.

Monte-Carlo Simulation model for teaching methodology.

Table 1.1: Frequency table for methods used by teachers

Sr. No	Methods for Teaching	Frequency (f)	Probability (p) $P = f/N$	Cumulative Probability (cp)	Random No. Interval
1	Lecturing Method	22	0.31	0.31	00-30
2	computer Based	19	0.27	0.59	31-58
3	Both Method	29	0.41	1.00	59-99
	Total N=	70	1.00		

Observation No.1: Monte-Carlo simulation model Verification result for 10 teachers teaching methods

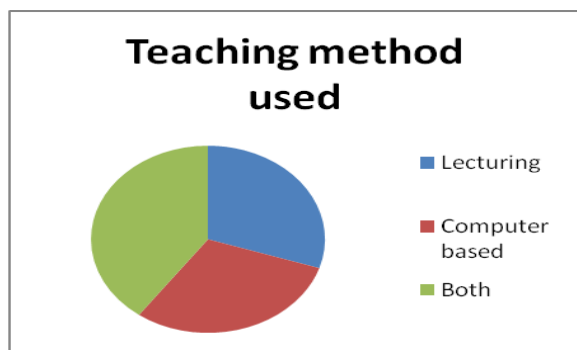


Figure No.1: Monte-Carlo simulation model Verification result for 10 teachers teaching methods

Observation No.2: Monte-Carlo simulation model Verification result for 10 teachers teaching methods

Table 2.0

Sr. No.	Random Numbers from Excel (observed)	Teaching Method used
1	74	3
2	65	3
3	17	1
4	14	1
5	43	2
6	97	3
7	84	3
8	31	2
9	37	2
10	24	1

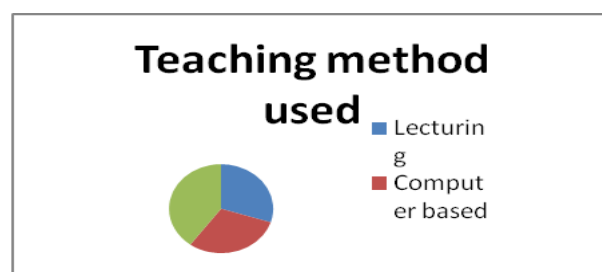


Figure No.2: Monte-Carlo simulation model Verification result for 10 teachers teaching methods

Fig 2 also tells that the majority (40%) of the teachers used computer based and lecturing both methods for teaching.

Observation No.3: Monte-Carlo simulation model Verification result for 100 teachers teaching methods

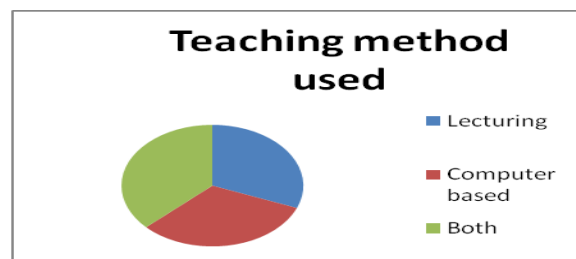


Figure No.3: Monte-Carlo simulation model Verification result for Used teaching methods for 100 samples.

Fig 3 represents same result of 100 entries that also represents that the majority (40%) of the teachers used computer based and lecturing both methods for teaching.

Table 2.1: Frequency table for methods preferred by students

Methods for Teaching	Frequency (f)	Probability(p) P= f/N	Cumulative Probability(cp)	Random No. Interval
Lecturing Method	10	0.17	0.17	0-16
computer Based	21	0.35	0.52	17-51
Both method	29	0.48	1.00	52-99
Total N=	60	1.00		

12. Conclusion and Future Scope

The teaching and learning is the most important activity in education system the study to find out which among them is best was the aim of the research. The mixed way of teaching and learning which involves teaching using technology Computer based and without using technology is mostly used by various teachers for teaching and learning process in higher education. Learning also is found effective by using mixed teaching method. The research can be extended by using other sectors in education filed for Primary education and other professional education courses. The study was conducted for one particular city. It can extend to other cities.

Abbreviations: TQM-Total Quality Management, QA-Quality Assurance.

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Mr. S. S. Rai Born on 20th March 1982. at Buxar District in Bihar. He has teaching and research experience of 6 years at PG at Bharati Vidyapeeth Instiute of Management, Kolhapur. He did MCA, M.Phil and is active in various social activities through NSS Cell of the Institute. He has published number of research papers in International and National Journals of repute. He has attended 4 National Conferences and presented papers in the Conference on his special subject in Computer Applications.



Prof. Anil Gaikwad born on 19th August 1970 , Completed his schooling from Sainik School Satara and has teaching experience of 18 years for MCA and BCA Students of the Institute of Management Kolhapur. He has completed MCM.MCA, MBA and M.Phil. and he is Pursuing Ph.D. degree from Shivaji University Kolhapur. He has published 13 Research Papers in International Journal of repute. He is also reviewer for 3 International Journals in the area of Computer Applications and Computer Management. He is Member of NSS Advisory committee of the University and is working as Programme officer in the Institute of Management Kolhapur.



Dr. R. V. Kulkarni Professor and Head Department of Computer Studies SIBER Kolhapur. Dr. R.V. Kulkarni is renowned academician and research guide in State of Maharashtra. He has rich experience in publication of Research Articles in International and National journal of Repute. He is recognized guide for Ph.D. and M.Phil. under Computer Applications and Computer Management subjects for various Universities in Maharashtra. He is member of Expert Committee for Research Presentation as Subject Expert in Computer Applications. He also provides consultancy to Banks and other professional Bodies in Computer Application Area. He has chaired and attended International and National Conferences on Artificial Intelligence and Expert System in Cities of Maharashtra State.