

# Framework for preparation of quality question paper

Mr. Kiran B. Malagi<sup>(1)</sup>, Mrs. Karuna C. Gull<sup>(2)</sup>, Ms. Veena M<sup>(3)</sup>.

<sup>(1)</sup><sup>(2)</sup>Assistant Professor, <sup>(3)</sup>Research Scholar, Department of CSE, K.L.E. Institute of Technology, Hubballi

**Abstract**— Education system plays a very important role in development of the country. To ensure the quality we need to strengthen every phase of education system. Different phases of education system comprise of Planning Curriculum, implementation of effective Teaching Learning process and adopt good methods of Evaluation. Outcome of the evaluation process reflects the quality of curriculum and the teaching learning methodology adopted. The assessment process involves deciding upon the type of evaluation method and drawing quality question paper. The quality of the question paper is measured through Blooms taxonomy. Many of the question papers available which are drawn by manual system are not up to the mark.

The manual process of question paper generation has its own issues. These can be addressed by automating the process. In this paper we focus on first step in evaluation phases which is question paper generation. This process is automated with a web application.

**Index Terms**— **Question paper generation, shuffling algorithm, Blooms taxonomy.**

## I. INTRODUCTION

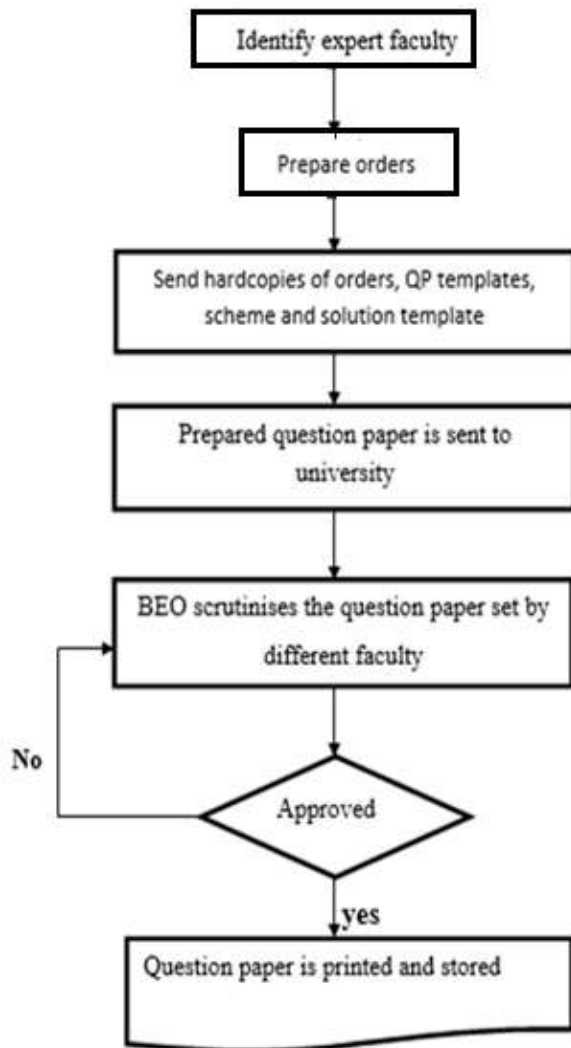
Education system plays a vital role in the development of country. A quote says “If you want to destroy a nation, just spoil its education system”. When the world is moving towards automation, it is very essential to automate some of the activities of the education system also.

Teachers are the backbone of the education system. In modern world teachers have become facilitators and they need to carry out more clerical work. This is the major reason for the need for automation of education system.

In an education system teaching and learning process (TLP) has to be given more importance. At the end, effectiveness of TLP is measured through student’s assessment and grades awarded. The assessment process is also very crucial and the examination questions would determine the quality of the students produced by the institutions/universities. The results speak about the quality of teaching learning and also guide us to improve the curriculum and instruction delivery method [1]. So, the question paper drawn to assess the students should be of good quality.

The current process of question paper generation, universities identifies the course experts from the affiliating colleges and asks them to set the question paper from the syllabus. Drawing the exam question paper is very challenging, tedious and time consuming activity for the faculty and also security of the drawn question paper is of major concern [2]. However, professors need to invest a lot of time and energy in preparing examination question papers.

Traditional approach to draw a Question Paper is given in a flowchart in Figure 1.



**Figure 1:** process for drawing question paper

Three months before the examination, this process of question paper setting starts. Once the faculty draws the question paper they have to send it through post to University, then scrutiny of question paper takes place. A total of minimum three sets will be finalized for one course. Like this, it has to be done for a minimum of 60-80 courses in a semester for which examination need to be conducted. In the scrutiny process, if the question paper is not up to the standard it will be rejected. Also, the credibility of the scrutiny expert team is also a major issue. Hence, it is clear that in this process a lot of paper work, communication delays are involved. Also there is no guaranty of the standard of question paper.

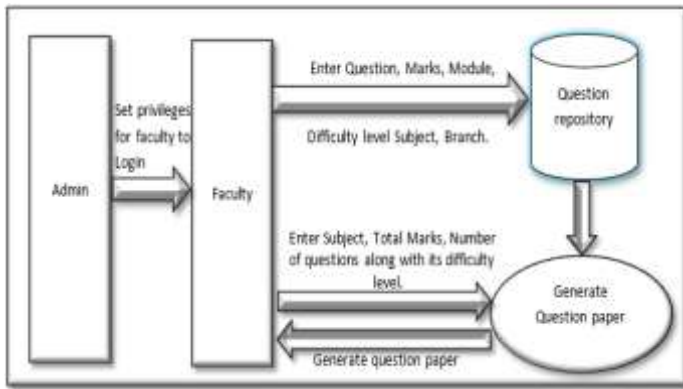
A question paper setter, while drawing question should take care about

- Blooms Taxonomy
- Time taken to attempt the required number of questions by student in limited hour of time.

The question paper setter needs to keep the questions very confidential. There are lots of ways the question papers can be leaked before the examination. They include

- Negligence of the faculty setting the question paper where he will not destroy the rough work sheets, once the final question paper is ready.
- Biasing towards students from his own institute
- Accidentally it may happen.

To avoid all such cases, a web-based solution is being proposed with the basic system architecture as given in Figure 2, where the identified faculty will create a repository of questions in the course handled. The repository will be maintained by the university. Admin will have privilege of setting the question paper pattern. Once the pattern is decided the question paper is drawn with the help of shuffling algorithm in Automatic test paper Generator System. The main part of the shuffling algorithms is to provide randomization technique in test paper generator, thus different sets of question could be generated without repetition and duplication. The question paper generated will be stored and circulated among all the affiliated institutions.



**Figure 2:** Architecture of QPGS

While setting the question paper care has been taken to follow Blooms taxonomy. The Blooms taxonomy is having six levels as given in the figure 3. In traditional examination system of India, in three hours a student has to attempt 100 marks questions. So, while setting question paper, questions with maximum level 3 can be asked.



**Figure 3:** Blooms Levels and description

The need for Blooms taxonomy while setting a question paper is that, students who are considered as slow learners, they should be able to pass the exam, and it should be challenging for the bright students to score high. So, the faculty who will be entering the questions in the repository need to enter the Blooms level also.

II. Literature survey

To develop Automatic question paper generator system, literature survey was carried out and the findings are discussed here.

“Framework for Automatic Examination Paper Generation System” this paper provides the process to generate automatic question paper [1]. Manually generation of question paper is quite a difficult task. This system provided a simple and efficient way for an examination paper generations. A three-tier model is provided in this framework [1]. Generation of Examination Papers is managed by the Syllabus Engine, Pattern Composer, and Question Aggregator. The system is based on the pattern or skeleton of the course. In the system, questions are entered through the Question Aggregator. Weightage, the difficulty level of question and marks these are the attributes of question paper.

A Library Automation System utilized in University of Toronto Library in 1963-1972[3] and the University of Illinois at Urbana-Champaign 1965-2000[4] Automated System for Educational Assessment [2] developed in Nigeria, e-Learning System [5], Automated Project Grading and Instant Feedback System [6] are well-known examples of Automated Systems. In these examples, automation is achieved in their manual process and improves performance.

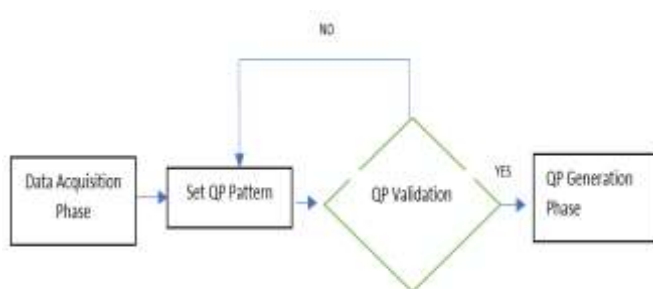
In automation converting the paper based system into the paperless system [7]. Automatic question paper generator system [8] used a randomized technique. This system has modules like user administration, subject selection, difficulty level specification, question entry, question management, paper generation, and paper management. The system uses attributes such as storing question in database, admin selected complexity level of questions, maintenance of the database.

### III. METHODOLOGY

The methodology proposed has the following components:

- Faculty authorization for entering the questions
- Platform for preparing the repository of questions with Blooms learning level and weightage for that question.
- To classifying the questions based on the Blooms learning levels.
- To extract the questions based on the criteria/pattern set by the admin/faculty.
- Validate the Question Paper
- Generating the question paper in .pdf file.

Question Paper Generator system is represented in Figure 4.



**Figure 4:** Phases of question paper generator system

- Phase I. In Data acquisition phase, the question repository is created. The authorized faculty approved by affiliating university will enter questions in the portal provided.
- Phase II. Admin or the faculty will set the question paper pattern by taking care of number of sub questions in each question, blooms levels and marks.
- Phase III. QP validation phase

The Administrator/faculty validates the question paper pattern.

- Phase IV. QP generation phase

The question paper generator uses shuffling algorithm. The main part of the shuffling algorithm is to provide randomization technique in question paper generation system, thus different sets of question could be generated without repetition.

The shuffling algorithm works as given below:

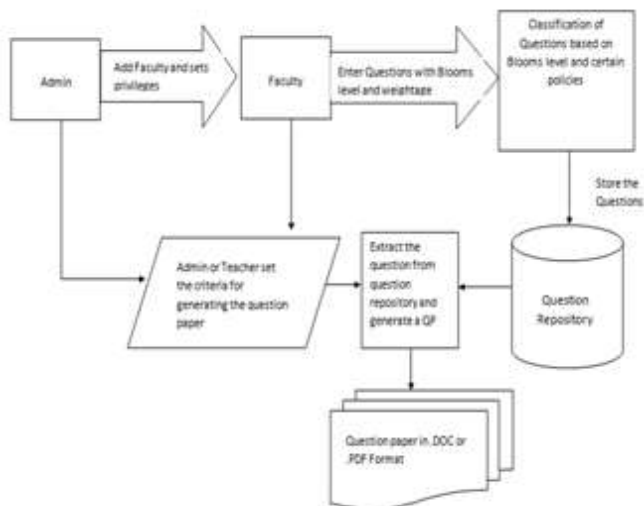
**Step 1:** Generate the number randomly

**Step 2:** Compare the number generated with the stored number in the array of previously generated numbers.

**Step 3:** If the number exists in the array then regenerate the number else store the generated number in the next empty location of the array and the question with randomly generated number will be selected.

**Step 4:** Repeat Step 01 to 03 till the complete question paper is generated.

The work flow of the proposed work is given in Figure 5. In this system admin will add the faculty and assign privileges for them. Authorized faculty will add the questions with respect to some bloom's level and weightage. The Blooms Level are Remembers, Understand, Apply, Analyze, Evaluate and Create. The questions tagged with one Blooms level and weightage are stored into the database for further processing. With this a standard database of questions will be generated.



**Figure 5:** Working of question paper generator

Now if the admin or faculty wants to extract question paper from the system based on some particular format, then they have to mention certain criteria such as marks allotment for each question, number of modules and number of questions to be included in each module. The question paper is displayed in .DOC or .PDF format. If faculty approves, then question paper will be generated and stored for future reference and further processing, else the previous phase, to reframe the question appears.

The different forms for included in admin and faculty Portal are:

➤ Admin Portal

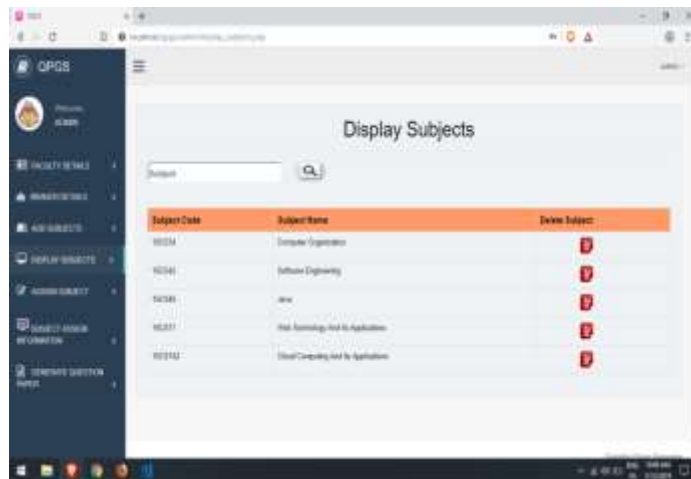
- Faculty Registration form/ Sign-up form
- Login form
- Faculty Details
- Branch details
- Add Subject
- Display Subjects
- Assign Subject
- Subject assigned details

➤ Faculty Portal

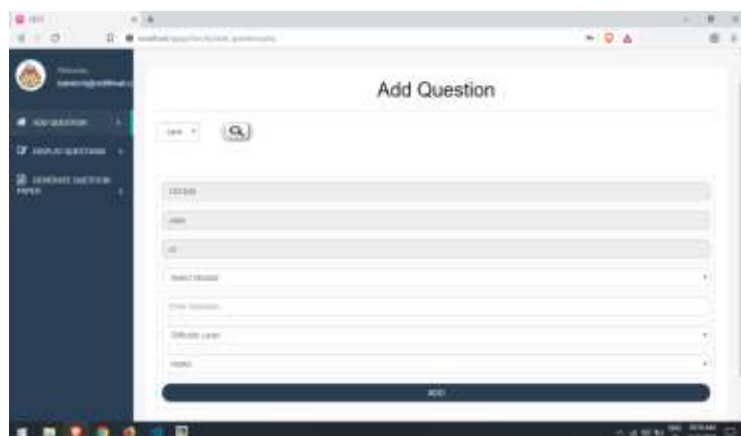
- Add Question

- Display Questions
- Generate Question Paper

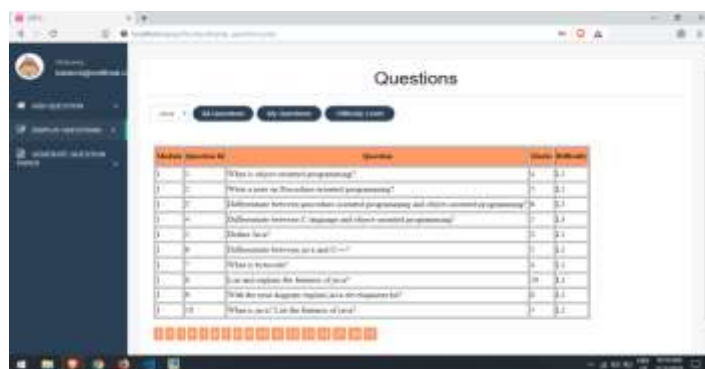
Some of the snapshots of the web pages are given in the figure 6 to 11.



**Figure 6:** Admin portal to display the list of subjects along with delete option.

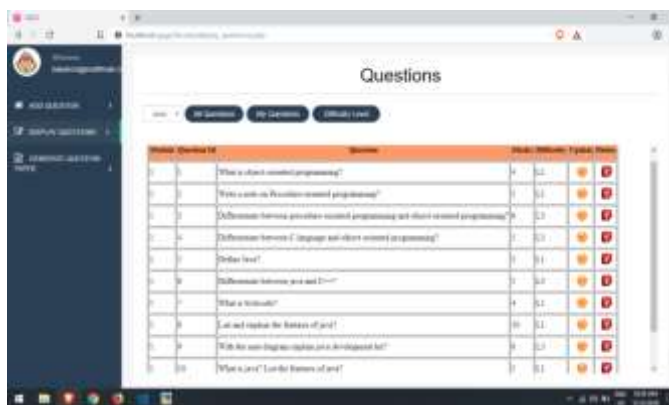


**Figure 7:** Faculty adding question to the subject.

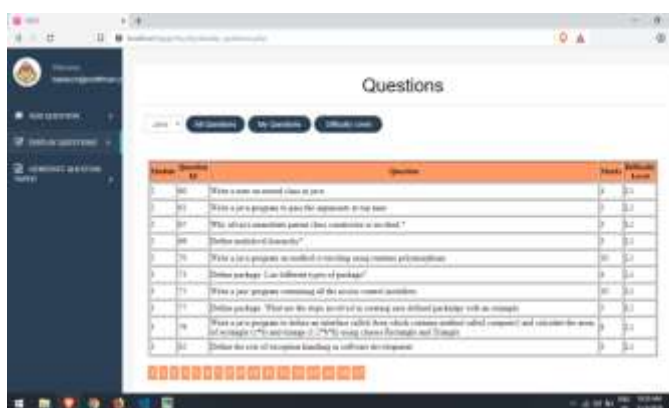


**Figure 8:** Faculty viewing all questions of his subject.





**Figure 9:** Faculty viewing only his questions where he can delete/update them.



**Figure 10:** Faculty viewing all questions of the subject based on difficulty level.



**Figure 11:** Admin generating question paper with help of table.

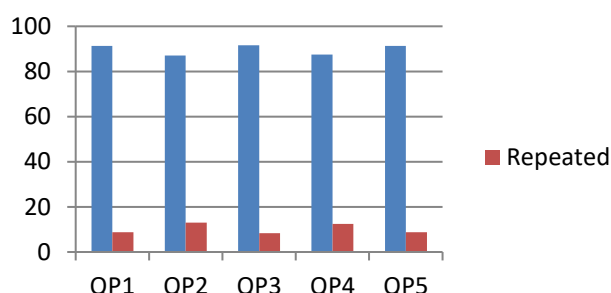
**IV. RESULTS AND DISCUSSIONS**

In the process of generating the question paper a total of five question papers were generated. Efficiency of the system is assessed based on the following criteria.

- Selection of Questions based on the parameters like Blooms level and marks.

- Repetition of questions in the question papers generated -
  - When the pattern is same
  - When the pattern is different

Based on the pattern set for question paper the repetition of the questions in different question papers is measured. If the number of questions is not sufficient with certain blooms level, then the system will generate a notification for the user saying that enter new questions with appropriate blooms level in the database. Let us consider an example, if we want to add two questions which are having same bloom's level and marks from one module, then if question with same bloom's level and marks is not available then the system will display "not enough questions to add; please insert new question into database or reselect the pattern".



**Figure 12:** Accuracy of the QPGS when pattern is different

Outcomes of this work are measured in terms of

- Average percentage of unique questions: 90.55%
  - Average percentage of repeated questions: 9.45%
- as shown in figure 12.

Quality of Question paper generated by the QPGS is decided based on the following study. In Table 01, five sets of question papers generated from the system, with the corresponding blooms levels have

been given. For three subject the question papers are generated.

Table 1: Different levels of questions in each question paper

Levels ↓	Question Paper →	QP	QP	QP	QP	QP
		1	2	3	4	5
L1		8	8	9	9	7
L2		6	7	10	9	11
L3		8	8	5	6	5

The question papers that are generated from the system are compared with university question papers and also are given to the experts from the university for comparison and the level of satisfaction is also high. By observing the questions in the question paper we could say that the questions are not very difficult for a weak student to pass the examination and are not so easy for bright students to get 100% marks. Hence the quality of question paper is assured to be good.

The snapshot of the question paper generated from the developed system is shown in figure 13.

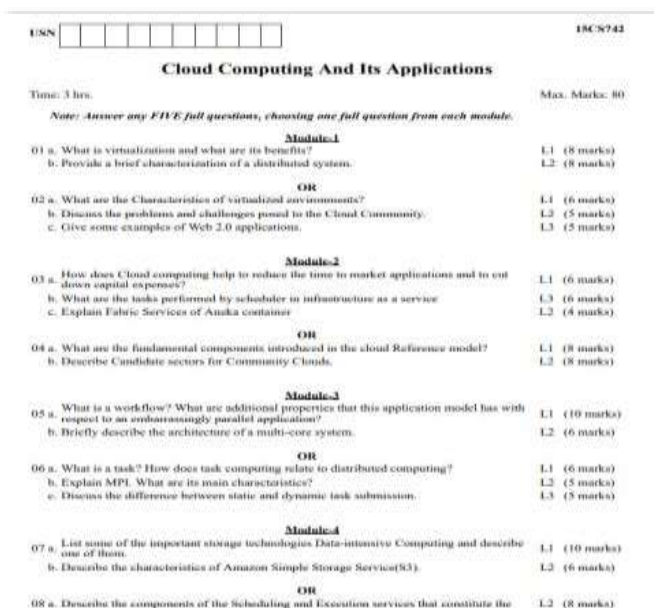


Figure 13: Generated Question paper using the application.

IV. CONCLUSION

It is evident from the results that the system has generated Question Paper without repetition of the questions. When multiple question papers are being generated, then an accuracy of 90.55% is achieved. This shows that one can trust this system for generating the question paper. As the number of questions in the database with different blooms levels and marks increase, efficiency of the system is still expected to increase.

Still there is scope for enhancements to make it more useful. Depending on the type of assessment required, like online quiz, it could smartly include all MCQs, or if user is choosing term test assessment, questions appropriate for more objective type and short answer are preferred.

It is concluded that the faculty drawing question paper must use appropriate action verbs so that students will come to know what the content is and how much answer to write for that question.

Lack of experienced teachers who can decide upon the selection criteria will be one of the limitations. If the selection criteria are wrong and learning level entered/classified is wrong then the Question papers generated will not be to the expected standards. Still the proposed system is a great aid for teachers/institutions/universities in generating question papers automatically from question repository.

V. REFERENCES.

[1] Anderson, L. W., Krathwohl, D. R., Bloom, B. S. (2001). A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives. [Online].  
 [2] Ashok Immanuel and Tulasi. B, "Framework for Automatic Examination Paper Generation

- System,” *International Journal of Computer Science Trends and Technology*, vol. 6, issue 1, Jan - March 2015.
- [3] Ewell, P. (2008). Building academic cultures of evidence: a perspective on learning outcomes in higher education. Symposium of the Hong Kong University Grants Committee on Quality Education, Quality Outcomes – the way forward for Hong Kong, Hong Kong. [Online].
- [4] Automatic Question Generation using Discourse Cues by Manish Agarwal\_, Rakshit Shah\_ and Prashanth Mannem.
- [5] Ritvars Bregzis, Calvin Gotlieb, Carole Moore , “The Beginning of Automation in the University of Toronto Library, 1963–1972”, in *IEEE Annals of the History of Computing*, April–June 2002..
- [6] Prof. Godswill Obioma Prof. Ismail Junaidu , Dr. Grace Ajagun, “The Automation of Educational Assessment in Nigeria: Challenged and Implications for Pre-Service Teacher Educaion”, Annual Conference of the International Association for Educational Assessment (IAEA) held at the Dan Panorama Hotel, Tel-Aviv, Isreal October 20th –25th, 2013
- [7] M. Jou, J.K. Shiau and H.W. Zhang, “Application of Web Technologies in Automation Technology Education”, *International Journal of Computers and Applications*, Vol.31, No. 4, 2009
- [8] Xiang Fu, Boris Peltsverger, Kai Qian, Lixin Tao, Jigang Liu, “APOGEE –Automated Project Grading and Instant Feedback System for Web Based Computing”, *Computer Science and Information Technology*, 2nd IEEE International Conference 2009.
- [9] Gerald Weber, “Defining the Paperless Workplace with the Paper Metaphor -Not a Contradiction in Terms”, Conference: Proceedings of the Fourth Australasian Workshop on Health Informatics and Knowledge Management -Volume 120.
- [10] Kapil Naik, Shreyas Sule, Shruti Jadhav and Surya Pandey, “Automatic Question paper Generation System using randomization algorithm” *IJETR*, Vol.2, Issue 12, pp.1-3, Dec 2014.
- [11] Umardand, A., Gaikwad A. (2017). A Survey on Automatic Question Paper Generation System. *International Advanced Research Journal in Science, Engineering and Technology (IARJSET)*, [Online].
- [12] Vidakovic D. et al. (2004). Bloom's Taxonomy in Developing Assessment Items - Discussion, Teaching Implications, and Conclusion. *Convergence Mathematical Association of America*.
- [13] W. Harlen and M. James, “Assessment and learning: differences and relationships between formative and summative assessment,” *Assessment in Education*, 4(3), pp.365-379, 1997.
- [14] J. Biggs, “Aligning teaching and assessing to course objectives,” *Teaching and Learning in Higher Education: New Trends and Innovations*, 2, pp.13-17, 2003.