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Idea Spinner and Clickable_image: Enriching Students Inter-activeness

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***Abstract*— The daunting horizon of Covid-19 has certainly upraised a new normal of e-learning environments. Nevertheless, participative engagement in online teaching has floated a challenge which is an implicit need for joyful learning. There is a need to keep our online as well as offline sessions live and enhance the student's involvement with joy. In this paper, two novice and interactive techniques are proposed namely Idea Spinner and Clickable_image. These techniques have assured its emphasis in online/offline educational teaching along with improvement in student's engagement. Idea Spinner is an underlying concept of a spinning wheel with 'n' concept quadrants interfaced via wheeldecide.com. Clickable_image under PollEverywhere.com is a tool to articulate our custom polls and intact it with our interactive sessions. The stated techniques were instigated for Third year B. Tech. – CSE (System Software) and Third Year B. Tech. ETC (Control Systems, Elective). The idea spinner technique has essentially assisted in uplifting the global outreach with a rise of 73% in active responses over regular questioning. Clickable_image has helped weak learning students to enjoy a focused image-based polling puzzle for enriching the feel of joy. The activity feedbacks were collected and analyzed over two parameters namely Understanding and Engagement of lecture and the Boredom period. The post-analysis has shown a noteworthy rise of 68% on first parameter underlying interactive lecturing and the Boredom period which has reduced by 73%.**

***Keywords*— boredom period; clickable_image; idea spinner; polls.**

I. INTRODUCTION

The Covid- 19 pandemic has provided an insight of new normal for almost many fields including education. In fact, in has broken our discernment of a normal activities. During the pandemic period, every step taken by students and teachers as a preventive measure has toppled the life of an individual. Governments have temporarily shut down the academic institutions during the period of pandemic. Unknown period of closure was the decisive time for every sector including education. As the situation led to an up growth of online schooling, this raised the bars of education sector with great responsibility. These days, the new normal is e-Learning in education field (Mou, 2023).

In post-COVID-19 session, the field of education has seen various gadgets and tools engaging students efficiently (Munna, 2021), (Moussa, 2021). Technologies supporting e-Learning platforms have materialized as a lifesaver as well as catalyst to upscale learning in online mode. Communication plays a major role in education field and e-Learning platforms have strived the driving force of interconnections. These 360 degree changes in online sessions have led a new perception to make education more flexible and available. Additionally, the young generations of college as well as school students are well defined by the proficient use of technology. Looking to the current scenario, we can surely admit that the utilization of technology will do its best to empower learning. Integrating technology with speedy changes of every domain has set a new corridor for upended lifestyle in pandemic. The concern of time-honored teaching is the only part which faculties needs to address in a very vita way. The unplanned delivery may lead to make off during live sessions who listen passively. The only solution to avoid such abscond behavior is to enrich interactive lecturing (Prince, 2004). Teaching with active learning techniques is a malleable approach that can be adopted gradually in the learning process (Hernández-de-Menéndez, 2019), (Hartikainen, 2019).

Active learning presents a prospect for experimenting e-Learning content while enriching knowledge. Student engagement involves faculty, course content along with peers in a planned and effective teaching-learning process (Tanis, 2020), (Selçuk, 2020 and Jadhav, 2017). The techniques should venture to strengthen critical thinking and decision making skills (Armbruster, 2009). The exchange of lecture contents between teacher and student is the main preface for quality education. Interactive lecturing encourages active learning along with intensifying attention (Tartavulea, 2020 and Patil, 2020). At the same time, live feedback escalates satisfaction at both ends. Interactive lecture engages delivery in an effective segmented way which triggers engagement (Theobald, 2020 and Sobral, 2022). This paper will help to explore the engagement triggers (Idea Spinner and Clickable_image) with the advanced digital techniques which will facilitate active student's engagement. The proposed techniques have been experimented with students at the undergraduate level of class size 65-75 students. These techniques were examined across the Understanding and Engagement of lecture and Boredom period parameter and found impressive.

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The outline of the presented work is as follows: section II deals with techniques in detail, section III arranges the review/analysis while section IV deals with runtime issues. Finally, the conclusion in terms of outcomes of overall work is stated in section V.

II. ONLINE/OFFLINE INTERACTIVE LEARNING TECHNIQUES

The procedure of both online/offline interactive learning techniques for the courses at Third year B. Tech. – CSE (System Software) and Third year B. Tech. ETC Elective (Control Systems) is as follows:

Idea spinner

Wheel Decide (wheeldecide.com) is a free tool. These online spinners assist in designing custom digital wheels. These wheels can be useful for various activities like decision making, raffles, etc. Coin flipping aids to make a decision, but it has only two sides. But Wheel Decide can help to flip a coin with 100 sides. It explicitly helps to settle disputes wherein decision is involved.

The basic concept is as follows:

- Teacher creates a spinner (wheel) marked into n quadrants and labels it as per the context of his topic/unit
  - For eg. A custom wheel created of 3 quadrants having labels as "Identify entities/relations, Design and Draw, Formulate constraints" for topics related to E-R modelling in Database course
- After the presentation of new material, the spinning activity is carried out by teacher. The student has to respond based on the location of the spinner
  - For eg. when the spinner lands on region "Formulate constraints", the faculty proceeds to ask student, "List the key constraints over the E-R diagram just presented"

○ In online mode:
  - The teacher needs to spin the wheel on behalf of the student or can provide the control of the screen towards student end to spin the wheel
  - When the spinner lands on respective region then the faculty will ask the question to the student inline with that region
  - Likewise, the teacher will proceed to next remaining questions

- Education usage
  - ○ Can select a random student to answer a question or participate
  - ○ Spinning of a wheel is carried out
    - A kind of substitute for shuffled learning with flash cards keeping each one on their toes
  - ○ Can make use of the wheel for assigning groups or teams
    - Similarly allocating jobs/tasks to teams or individuals
    - It has no biases

Fig. 1 represents the detailed steps of idea spinning technique.

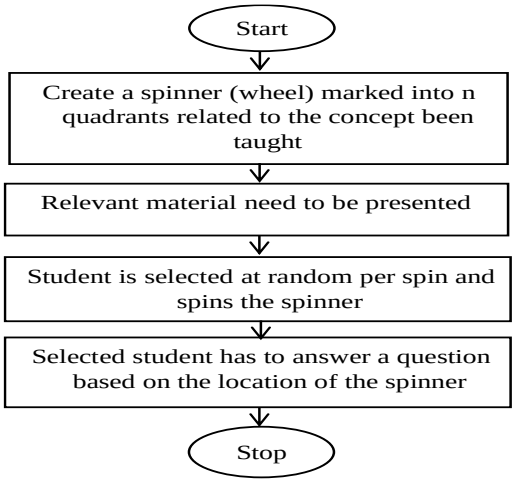

Fig. 1 Flowchart of Idea Spinner Technique

The step-wise procedure from idea wheel creation till questioning a student for a random spin is sighted in Fig. 1 flowchart. The flowchart position the role of faculty and student in specific.

Clickable_image

Clickable image is the utility provided under Polleverwhere.com platform. After the conduction of topic, a faculty is required to upload the relevant image selected for response. Students have to respond to the question given on image in terms of "Clicks" to the exact position stating the correct answer. This activity is useful for courses in which block diagrams and structural representation are required. In Control Systems course, there are two types of control systems viz. open loop system and closed loop system. Different plots are also part of control systems. Students are needed to remember the function of each block as well as they should find out the particular region of various plots.

After an explanation of any block diagram, we can collect feedback of their understanding about function of each block or identification of any region of the plot.

The basic concept is as follows:

- Login Poll Everywhere (https://www.polleverywhere.com/)
- Click "Activity" button
- Go with the option "Clickable Image"
- Provide the question as input in Title section
- Either upload the image of relevant study Or choose from the templates given
- Press "Create" to complete poll question
- Press "Activate" option on right top corner to run the poll

- Education usage
  - ○ Visualize students feedback in real time with a variety of activities to measure engagement, follow up on feedback and uncover next steps
  - ○ Use certain activities to take attendance, give quizzes, and gauge understanding of whether the students are near or far of delivered concept

While delivering of topic, a faculty creates a Clickable_image question in context to: Identify the intersection point of root locus plot. Students have responded as shown in given Fig. 2.

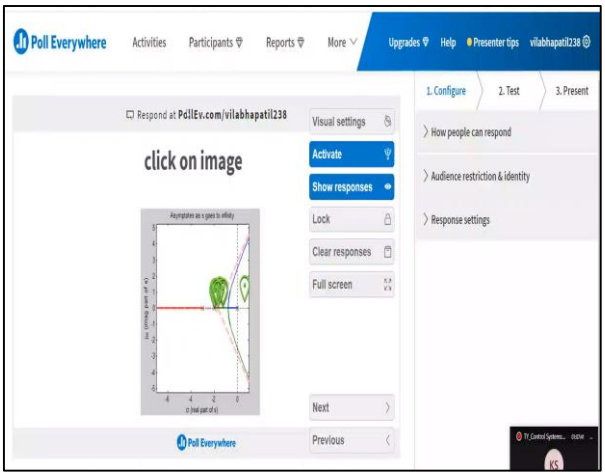

Fig. 2 Response of Students for Clickable_Image

The responses over images can be analyzed to check the correctness and understanding of students.

III. EXAMINATION AND ANALYSIS OF TECHNIQUES

The introspection of conducted techniques has revealed its ingenuity while conducting online/offline sessions effectively. Almost of the time, students have shown active interest in participation and collaborative learning.

The active involvement and its outcome in experimented courses are as follows:

Idea spinner

This technique was demonstrated at third year B. Tech. – CSE (System Software course). The proposed activity was planned for following lectures:

This activity is planned for the following chapters/points:

- Chapter 1:
  - Pass structure of assemblers
    - Time for this activity: Lecture-5
- Chapter 2:
  - Advanced macro facilities
    - Time for this activity: Lecture-10
  - Design of a macro pre-processor
    - Time for this activity: Lecture-12
- Chapter 3:
  - Design of a linker
    - Time for this activity: Lecture-14
- Chapter 5:
  - Three-address code
    - Time for this activity: Lecture-26
  - Boolean Expression
    - Time for this activity: Lecture-28
- Chapter 6:
  - Next-use information
    - Time for this activity: Lecture-34

The real-time proof of conducting this activity is affirmed in Fig. 3 (offline session) and Fig. 4 (Online session).

One can demonstrate some online dynamic wheels' demo readily available on the site. A custom wheel is created during each lecture once the content is delivered. One prepared for a lecture viz. "Advanced macro facilities" is as:

- A custom wheel as presented in Fig. 3 is created of 7 quadrants having labels as "AIF Statement, AGO Statement, ANOP Statement, GBL, EV specification, REPT, IRP"

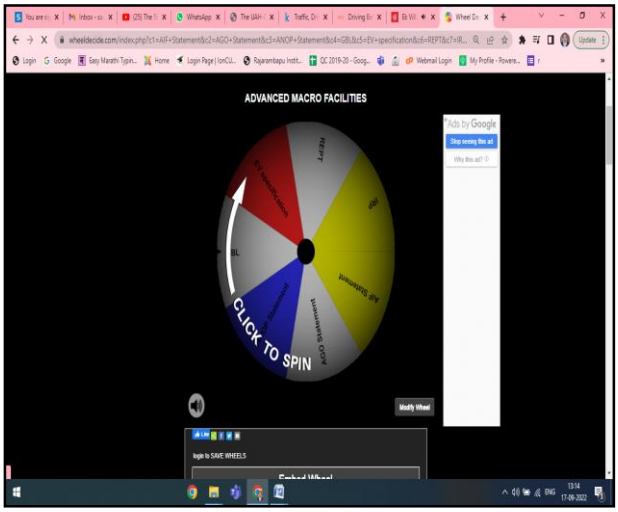

Fig. 3 Idea Spinner of Advanced Macro Facilities over Wheeldecide.com (Offline)

- After the wheel is created as shown in Fig. 4, a student is selected to answer the usage of respective macro facility pointed by wheel pointer
- If the same point relocates then either the student can respond with a new example or can re-spin the wheel
- In response to student reply, faculty engage the discussion inline to the response and motivate others to provide different dimensions over that point

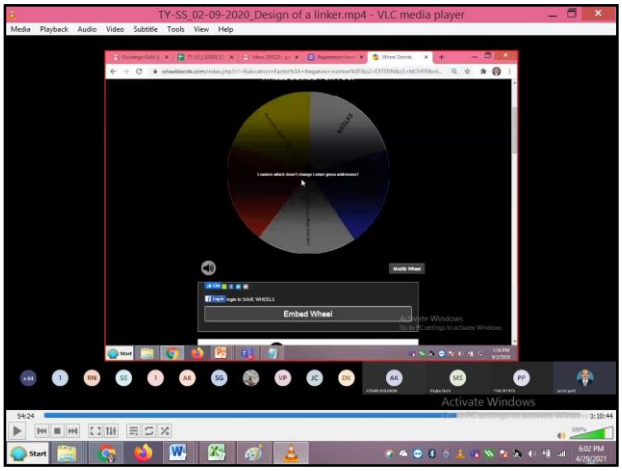

Fig. 4 Idea Spinner for Content "Design of a Linker" (Online)

The activity has helped to keep students interactive and engage with on the fly attention at random. It also stimulates improved attention and interest during content delivery.

An overview of outcomes is stated as:

- Tangible outcomes:

Feedback based on hand-raise was collected and analyzed to note the Impression of Lecture under non-activity versus activity based lectures. The feedback was noted on four different parameters viz. Interactiveness, Attention, Joyfulness and Teamwork.

The analysis is stated in Table 1:

Table 1. Feedback Responses

Particulars	% of offline class responded (Average Regular lectures) A	% of Online class responded (Average Idea Spinner-based lectures) B	% of offline class responded (Idea Spinner-based lectures) C	% of rise in response (A v/s C)
Interactive	38	61	77	67
Attention	42	68	87	69
Joyfulness	39	NA	81	70
Teamwork	25	NA	49	64
			Average	**68**

*NA: Not Applicable during Online session

The analysis in Table 1 states the feedback responses which signify an average rise of 68% in Idea Spinner-based activity lecturing compared to regular lecturing in offline mode. Moreover, the % of Attention and Joyfulness is elevated compared to other parameters. There is a need to improve across teamwork component for planned activity.

The feedback for online lectures exemplifies the same outcomes. However, the comparative study of responses between offline to online lectures for Idea spinner activity depicts an elevated impact of offline conduction on the basis of the first two parameters (The Joyfulness and Teamwork parameters can't be directly assessed in online sessions).

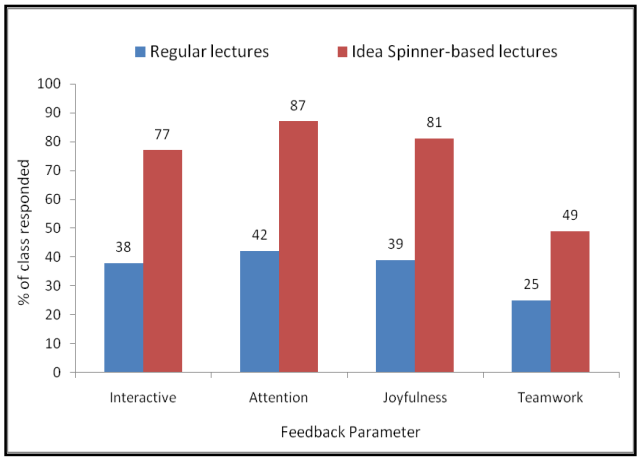

Fig. 5 Comparative Analysis of Responses

Fig. 5 states the comparative analysis of responses for the recorded parameters. Additionally, the tangible impact was seen in Unit Test-1, 2 and End-Sem. Exam for the covered topic under this activity.

Table 2. Questions Attempted Inline to Idea-Spinner activity

Exam Category	Question no.	Total Students	No. of students attended the questions	Avg. marks scored (Out of actual marks)
Unit Test (UT)-1	1.a) Optional	72	63	6 (8)
	2.b)		71	6 (7)
Unit Test (UT)-2	2.a)	72	69	5 (7)
End Semester Exam (ESE)	1. b)	72	69	6 (7)
	2.a)Optional		61	7 (8)
	3.a)		70	6 (7)
	5.b)Optional		63	8 (10)

The analysis of % of attempts for UT and ESE questions in mandatory and optional mode is affirmed in Table 2. The % of attempt represents an average of 82% whereas it's above 96% for compulsory questions. Equally the rise in average marks compared to other questions have aided to in improving course outcome.

- Intangible outcomes:
  - Extended the joy of learning
  - Experienced a collaborative effort toward refining the answer provided by a peer member
  - Seamless attentiveness along with interest

Clickable_image

This technique was demonstrated at Third year B. Tech. – ETC (Control Systems elective course). The proposed activity was planned for following lectures:

This activity is planned for the following chapters/points:

- Chapter 1:
  - Open loop_Closed loop system
    - Time for this activity: Lecture-3
  - Feed-forward gain
    - Time for this activity: Lecture-5
- Chapter 2:
  - Time-domain analysis of 2nd order system
    - Time for this activity: Lecture-8
- Chapter 4:
  - Root locus
    - Time for this activity: Lecture-22
- Chapter 5:
  - Bode plot
    - Time for this activity: Lecture-27

A custom Clickable_image is created during each of the above-stated lectures based on the content of delivery. One prepared for a lecture viz. "Feed-forward Gain" is presented in Fig. 6.

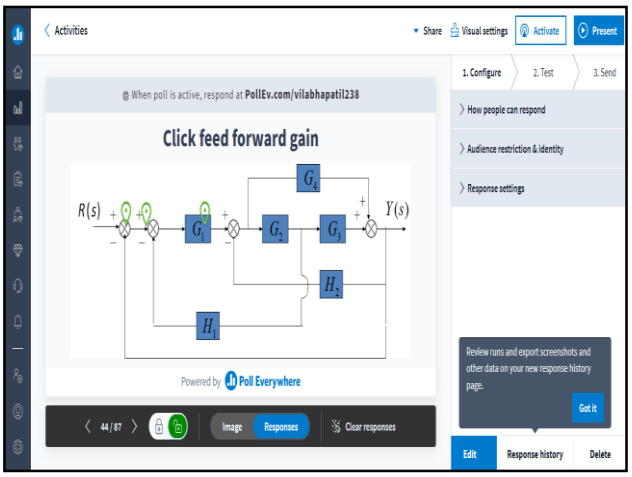

Fig. 6 Responses of "Feed-forward Gain" Over Clickable_image

The activity has helped to keep courteous attention of students in the dynamic classrooms focusing on engaged theme of delivery. This activity has helped students to understand the basic concepts by putting the right responses at the right places on given image through Poll Everywhere login.

An overview of outcomes is stated as:

- Tangible outcomes:

A survey based on G-form was collected and analyzed to note the reduction in Boredom period. The feedback was noted on three different questions (on a scale of 1 to 5: 1 as Strongly Agree and 5 as Strongly Disagree):

(1) How well the activity creates joy of learning
(2) How well it is effective to understand the concepts
(3) The activity has helped to create interest in subject

The analyses for responses are stated in Fig. 7, 8 and 9.

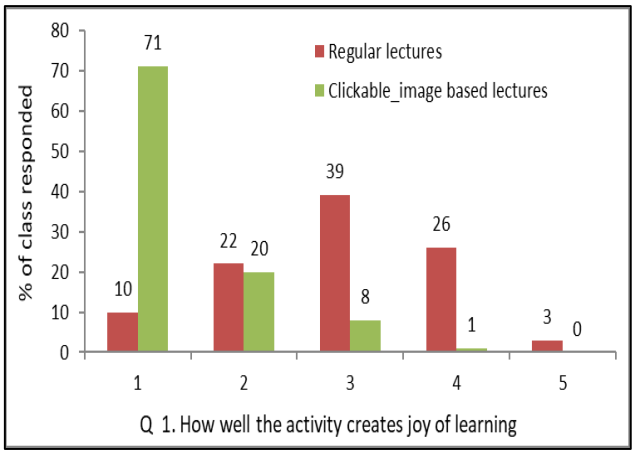

Fig. 7 Comparative Analysis of Responses for Q.1

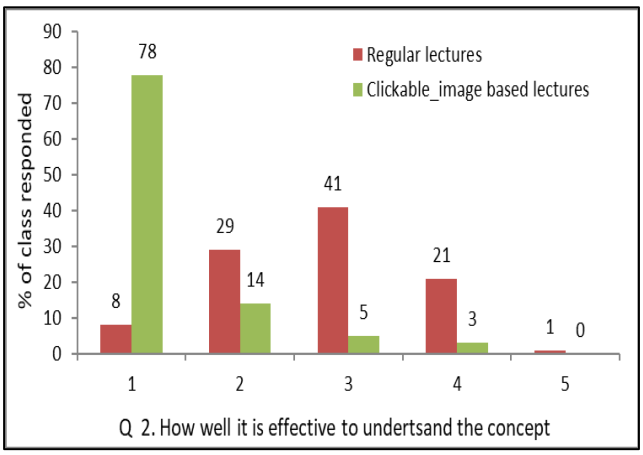

Fig. 8 Comparative Analysis of Responses for Q.2

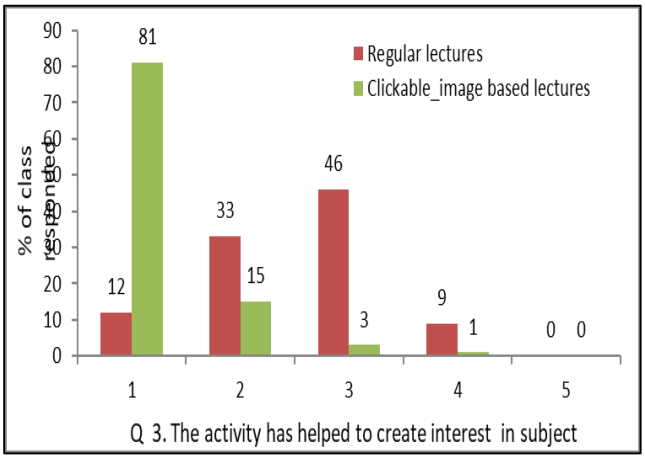

Fig. 9 Comparative Analysis of Responses for Q.3

The analysis in fig. 7, 8 and 9 states the average drop in Boredom period by 73% experimenting with Clickable_image based activity in lecturing sessions. Moreover, the % of interest in subject is elevated compared to other parameters.

- Statistical Analysis using Index of Quality Variation (IQV):

IQV is a statistical technique that helps to determine the dispersion of cases across categories of variables. The value of dispersion ranges from 0 (no dispersion or variety) to 1 (maximum dispersion or variety). 1 refers to even numbers of cases in all categories, not that cases are distributed like population proportions. IQV is affected by the number of categories under consideration.

The formula for IQV is stated below:

$$IQV = \frac{K(100^2 - \Sigma\, cat.\%^2)}{100^2(K - 1)} \qquad (1)$$

- K=# of categories
- cat.% = percentage in each category

As per data in fig. 9 for the Q.3 "The activity has helped to create interest in subject", the following variables are initialized as:

- K=5
- ∑cat. 1(% of Offline class responded (Average Regular lectures))%^{2} = 2734
- ∑cat. 2(% of Offline class responded (Average Idea Spinner-based lectures))%^{2} = 4256

$$\text{IQV (Cat. 1)} = \frac{5(10000-3430)}{10000(5-1)}$$

$$\text{IQV (Cat. 1)} = \frac{32850}{40000} = 0.821$$

$$\text{IQV (Cat. 2)} = \frac{5(10000-6796)}{10000(5-1)}$$

$$\text{IQV (Cat. 2)} = \frac{16020}{40000} = 0.405$$

Comparing the IQV values of both the categories states that the category 1 values inline to responses for "Regular Lectures" depict more dispersion. The responses overall 5 categories of scores in "Regular Lectures" represent more scattering of reactions which implicitly conveys the trend towards Clickable_image based lectures.

Furthermore, the analysis of direct outcomes is visualized in terms of Unit Test-1,2 and End-Sem. exam marks. The details of attempts are as follows:

Table 3. Questions Attempted Inline to Clickable_image activity

Exam Category	**Question no.**	**Total Students**	**No. of students attended the questions**	**Avg. marks scored (Out of actual marks)**
Unit Test-1	1.b)	32	31	5 (6)
	2. a)		30	7 (8)
Unit Test-2	1.a)		32	6 (7)
	1.b)		31	5 (7)
End Semester Exam	2.b)Optional		27	7 (8)
	3.b)		32	8 (10)

The analysis of % of attempts for UT and ESE questions in mandatory and optional mode is affirmed in Table 3. The % of attempt represents an average of 94% whereas it's above 97% for compulsory questions. Equally the rise in average marks compared to other questions have aided in improving course outcome.

- Intangible outcomes:
  - Productive collaboration while group learning
  - Shades of additional clues for taken concept

IV. CONCERNS WHILE CONDUCTING THE ACTIVITIES

Conduction of activities was a new learning for all of us. Planning and its conduction as per expectations were augmented with some intangible outcomes stated in section III. Furthermore, a few issues (Norte, 2020) were faced during experimentation of these active learning strategies as follows:

- Time management as per desirable units
- Quality of questioning across expected outcome
- Measurement of complete joyful status
- Absenteeism of engaging students

More focus attention is to be provided for recording joyful status in a concrete sense along with time-controlled actions. The deficit of quality questioning has to be refined further with multiple angles for its tangible measurement. The issue of attendance is still out of the strategic plan which needs program-level policies for all courses.

V.DISCUSSIONS

The proposed techniques have incepted a new dimension towards active learning strategies which improves involvement. The preparation of Idea spinner needs a planned thought process while its conduction nurtures the in-class dispersion of learned concepts. Moreover, it floats a conductive environment like MCQ's wherein a student has to critically address the pin-pointed question. Additionally, he/she may take the help of his friend mimicking the context of "Phone-a-Friend" in KBC. Clickable_image adds a novice sense of feedback on discussed concept to know a global overview of classroom learning at the same time. The questions may be focused only on the specific local notion across the global sense of discussion while conducting the concept. Implementation of both techniques assists in a wholesome way to both sides of learning viz. faculties and students. Furthermore, the digital sagacity of techniques aids in simple involvement of students and decreases reluctance towards active learning.

VI. CONCLUSIONS

Proposed active learning techniques namely Idea-spinner and Clickable_image were demonstrated at diverse graduation levels from different departments. The two courses were taken under consideration while experimenting with this techniques viz. System Software of Third year B. Tech. (CSE) and Control Systems (Elective) of Third year B. Tech. (ETC) Program. These techniques have assisted effectively in connecting large classrooms which improves student engagement. Various shades of interactive online/offline sessions with proposed two techniques have provided a wholesome degree of angle over the conducted activities. The comparative responses in Table 1 have helped to diagnose an average 68% rise in interactive lecturing using the Idea-Spinner technique. While the tangible ascend was observed seen in attempt of Unit and End-Sem. examination. Experimentation has facilitated to extend the joy of learning with picture-perfect attentiveness while learning. Clickable_image has been able to provide an intact view of the proposed topic while trailing the relation of clue with a unique point over the image. As stated analysis in Table 3., a tangible increase in attempts of compulsory/optional questions are visualized along with average marks for attaining course outcomes. The statistics of survey plotted in fig. 7 to 9 implies to note the reduction in Boredom period by 73%. The % of joyful learning is elevated compared to other parameters. Direct involvement of students/groups with random pin-point has elevated the attentiveness with leveraging dynamic environment during teaching-learning process. An intangible reimbursement across collaborative learning and argued responses in teams to prepare complex topics is observed. Special efforts towards time management and qualitative questioning need to be emphasized further.

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