

Visual Outcome Mapping of Learning Connections and Interventions for Higher Education

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ABSTRACT

Modern higher education is under siege, and various difficult issues have emerged as a result of changing students' needs and diverse learning styles. These include problems associated with curriculum design, student retention, quality of teaching and learning processes, and integration of technology. The modern technological tool named Visual Outcome Mapping (VOM) has evolved and has the potential to provide innovative solutions by acquiring, analyzing, and presenting data relevant to student performance in pursuit of effective personalized learning and timely feedback. The mapping is done between challenges, teaching methodologies, and levels of Bloom's Taxonomy using VOM. The paper highlights that even small engagement and creative activities can lead to achieving higher-order skills. It elaborates how the usage of creative tools like GIS and Mentimeter leads to enhanced engagement, while real-life scenario integration, breakpoint activities, site visits, hands-on assignments, and continuous feedback have shown positive impacts on critical thinking and reduced instances of plagiarism. It focuses on teaching strategies that must be adapted to student needs and interdisciplinary learning must be emphasized. The VOM model was validated with the analysis of 108 survey samples collected from the students as feedback using the correlation technique. It concludes that students learn better with activities and they prepare students for the demands of the real world. VOM is a creative approach that addresses the challenges of modern education, ensuring that students are well-prepared for the workforce and committed to lifelong learning. The study paves the way for future research and scope.

Keywords

Higher Education
Higher Order Learning
Learner Development
Learning Connections
Visual Outcome Mapping

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Introduction

In a world where students are changing, their learning styles are evolving, and their demands are shifting, higher education faces several challenges. Most submissions identify designing curriculum, retention of students, innovative technology, the quality of learning and teaching, increasing engagement, quality of research, funding, and the need to enhance governance and administration as the most important challenges, and modern technological tools and robust data infrastructures offer innovative responses to these challenges [1]. They enable the collection, analysis, and visualisation of vast amounts of data related to student performance and learning outcomes. Additionally, these technologies can personalize learning experiences, adapt to individual student needs, and provide real-time feedback, thereby enhancing the overall educational experience [1].

The need to provide better assessment and enhancement of the quality of learning outcomes has been underscored within the dynamic environment of higher education [2]. A greater emphasis is placed on institutional accountability concerning what students learn in skills and abilities acquired, and not simply on the knowledge provided [3]. Traditional methods of assessment often cannot satisfactorily account for the scope of student development and learning. The present paper focuses on some new ways to achieve a more complete and nuanced understanding of educational outcomes through mapping.

While the literature extensively discusses learner engagement strategies, active learning practices, and the application of Bloom's Taxonomy in higher education, limited research systematically maps classroom challenges, pedagogical interventions, and higher-order learning outcomes within a unified visual and validated framework. Existing approaches often address engagement, assessment, or technology integration independently, but rarely integrate these dimensions into a structured model that visually connects challenges, instructional strategies, and measurable learning outcomes. This conceptual and practical gap forms the basis of the present study.

A. Designing Curriculum

Higher education institutions must redesign curricula to support global and contemporary student needs [4], [5]. This includes addressing societal expectations, offering interdisciplinary programs, and adapting courses and structures for increasingly sophisticated students [6].

Mutual recognition of degrees and credit points is also essential for maintaining quality while accommodating individuality and diversity [1].

B. Industry-ready Students

Meeting the expectations of discerning students and aligning curricula with evolving employment trends is challenging [4], [6]. However, industry partnerships, career-focused programs, and a responsive curriculum can significantly enhance students' employability and satisfaction [1].

C. Learning and Teaching Quality

Teaching and learning in higher education pose substantial problems [7]. The transition from traditional lecture-based methods to student-centered approaches necessitates adjusting to varying student groups with different learning styles and backgrounds [4], [8]. Furthermore, successfully integrating technology [9], addressing various levels of prior knowledge, and assuring active involvement [10], [11], [12] are all significant concerns. Institutions must also focus on establishing novel teaching tactics and evaluation approaches to improve learning results and suit students' changing demands.

D. Student Retention Time

Higher education faces a major problem with student retention, which is impacted by a variety of personal and institutional variables, including family obligations and mental health, as well as financial limitations and academic readiness [13], [14]. Furthermore, studies show that during lectures, Generation Z students usually pay attention for roughly fifteen minutes before losing it [15], [16]. Teachers find this especially difficult because lectures typically last between 45 and an hour, necessitating the use of creative teaching techniques to keep students interested and increase retention.

E. Adopting Innovative Technology

Using innovative technology in higher education presents many difficulties. Excessive expenses might put a strain on institutional finances, yet for optimal utilization, thorough training and support are required. It can be tricky to integrate new technologies with older ones, sometimes requiring quite large infrastructural changes. The process of adoption can also be slowed by the resistance of teachers and students, perhaps used to older ways of doing things [17], [18].

F. Assessment/Evaluation

The challenges to assessment and evaluation within higher education are complex learning outcomes. For e.g., creativity and critical thinking, are often hard to measure in a traditional sense, and activities that promote higher-order thinking skills are particularly challenging to assess. In fact, more difficult to assess are activities that promote higher-order thinking skills [19], [20]. More inclusive and fair assessments are necessary to cover the diverse needs of

students. The newer forms of assessment that digital tools have brought about need careful designing for accuracy and fairness purposes [21]. It can be challenging to find a balance between formative and summative assessments because when one relies too much on one of them, it hinders learning [22]. Further, the faculty members may not have received the requisite training to use effective evaluation processes. Such problems need creative solutions along with continuous professional development of the faculty.

G. Plagiarism Incidences

Academic integrity and educational quality are negatively impacted by plagiarism, which is a significant problem in higher education [23]. Due to complex concealing techniques and software restrictions, plagiarism detection is challenging [24]. Inconsistencies in the way cases are handled are caused by different definitions and institutional procedures [25]. Teaching appropriate research and citation techniques and resolving cultural variations in intellectual property understanding are necessary for effective prevention [26], [27]. To maintain academic standards and integrity, institutions need to make investments in clear regulations, instructional methodologies, and detecting technologies [28].

H. Critical Thinking and Problem-Solving Skills

In higher education, critical thinking and problem-solving abilities are vital but difficult. It might be challenging to regularly employ creative teaching techniques and an effective curriculum design to develop these skills [29]. Using conventional methods to assess these higher-order skills is frequently insufficient [30]. Pupils arrive at different skill levels, and closing these gaps takes a lot of work and resources (Brookfield, 2012). It can be difficult to engage students and integrate these skills across fields [31]. To address these problems, supportive learning environments and a variety of teaching techniques must be used to help students develop critical abilities [32].

This paper extends the existing learner engagement strategy, a pedagogical approach that aims to enhance learner outcomes, promote active participation, address diverse learning needs, and improve communication and collaboration. Furthermore, it fosters social and emotional development among students, among other benefits. Despite its advantages, the strategy is not without limitations, including extensive resource dependence, the complexity of catering to varied learner needs, resistance to change, challenges in assessment, the digital divide, time constraints, and scalability issues, among others. These challenges have been identified through an exhaustive literature review, feedback collected from the Teaching and Learning Showcase 2024 at the university, and direct observations within the classroom. Based on these insights, the research questions driving this study have been formulated, as detailed in the research methodology section.

The study introduces the technique of Visual Outcome Mapping (VOM), a novel framework designed to overcome the limitations of traditional learner engagement strategies. Visual Outcome Mapping (VOM) is conceptualized as a structured pedagogical mapping framework that systematically aligns classroom challenges, engagement interventions, and Bloom's Taxonomy levels through visual representation supported by empirical validation. Unlike isolated engagement techniques, VOM integrates qualitative classroom practices with quantitative feedback analysis to provide a transparent linkage between instructional strategies and higher-order learning outcomes. VOM integrates low-cost digital tools such as Mentimeter, Google Forms, and Canva, which are accessible and require minimal financial investment. By customizing activities to align with students' learning styles and Bloom's Taxonomy levels, and incorporating breakpoint activities and real-life scenario integration, VOM enhances engagement. The use of interactive tools like Mentimeter and Kahoot ensures the scalability and accessibility of the approach, even for remote learners. Furthermore, activities such as site visits, guest lectures, and collaborative learning are adaptable to various group sizes, enhancing flexibility and inclusivity. One of the key limitations addressed by VOM is the visual representation of the alignment between learning activities and desired outcomes, which is validated through student feedback and correlation analysis. This approach aims to provide a solution to the identified research questions, particularly in the context of higher education. It examines the potential benefits, challenges, and policy implications of VOM in fostering higher-order skills development.

However, the scope of the study is limited by its focus on specific postgraduate programs, the reliance on technology, a small sample size, and the lack of long-term impact analysis, which affects the generalizability of the findings. Despite these constraints, VOM presents a robust framework for addressing key educational challenges, particularly in fostering higher-order thinking skills such as analysis, evaluation, and creation in higher education. This paper aims to highlight the transformative potential of VOM in promoting a more holistic, student-centered approach to learning and assessment. Furthermore, it discusses how the integration of technology and feedback mechanisms can support these efforts, addressing the evolving needs of modern students and the dynamic landscape of higher education.

Material and Methods

The research is based on primary data, observational analysis of the techniques employed in the classroom, and feedback received. The study adopts a mixed-method approach combining qualitative classroom observations and quantitative survey-based validation. The qualitative component involved systematic observation of classroom practices and reflective documentation of pedagogical interventions across courses. The quantitative

component was used to validate the proposed framework through structured student feedback analysis. The primary data was collected in the form of feedback from 108 students of two programs, namely MBA- Real Estate and Urban Infrastructure Management (MBA-REUIM) and Master of Planning (M-Plan). The sample represents postgraduate cohorts enrolled during the academic year in which the interventions were implemented. A purposive sampling approach was adopted, as the study focused specifically on courses where Visual Outcome Mapping (VOM) was actively implemented. Participation in the feedback survey was voluntary and anonymous to ensure unbiased responses.

The challenges in teaching-learning were identified from the literature review, discussions with faculties at Teaching-Learning Platforms, and classroom observations. Teaching-learning platforms comprise institute-level Teaching-Learning Practices showcase events and the IUCEE-International Engineering Educator Certification Program. The identification of challenges was based on triangulation of three sources: scholarly literature on higher education challenges, peer discussions and institutional teaching-learning forums, and first-hand classroom observations conducted over multiple course cycles. This triangulated approach enhanced the credibility and contextual relevance of the identified challenges.

Various activities were conducted in the class based on the course requirements, course objectives, and program objectives. The activities involved experimental learning, incorporating technology, active learning, reflective learning, and collaborative learning. The activities were divided into seven categories: generating real-life needs, breakpoint activities, site visits and guest lectures, hands-on assignments, relationships between courses, using creative technology, and continuous feedback. Most of these activities are not assessed/marked and it is difficult to measure the outcome of learning happening through these activities. Therefore, a visual outcome mapping of challenges and activities is done.

VOM is a contemporary technique evolved in this paper, which portrays both qualitative and quantitative data in a way that imparts to students' learning objectives achieved by the activeness of visualization. The means are interactive and dynamic, which helps to track, evaluate, and share the evolution of students' learning with activities conducted in the class. VOM helps educators, administrators, and stakeholders visualize the efficacy of educational programs and curricula. Besides aiding in the identification of learning gaps, the use of VOMs at the level of higher education also serves to match instructional tactics to the intended learning objectives. In addition, it enhances accountability and transparency among parents, legislators, and learners because it is quickly understandable.

For operationalization, each classroom activity was systematically mapped against the identified teaching-learning challenge, the corresponding pedagogical intervention, and the targeted Bloom's Taxonomy level (Apply, Analyze, Evaluate, Create). This structured

alignment enabled the creation of a visual matrix linking instructional strategies with measurable higher-order learning outcomes.

To understand if higher-order learning is achieved by the students the activities were mapped with Bloom's Taxonomy (BT) through understanding. Feedback was conducted twice in a session for every course along with various live feedback. Mid-course feedback to improve the course content and End-course feedback to take suggestions and assess higher-order learning.

The feedback instrument consisted of both closed-ended and open-ended questions designed to measure enjoyment, applicability, perceived knowledge gained, and effectiveness of class activities. Closed-ended responses were structured using categorical and Likert-scale formats, enabling quantitative analysis, while open-ended responses supported qualitative insights.

The visual outcome mapping of challenges, activities, and Bloom's Taxonomy level is presented in the result. The analysis of primary data from 108 surveys was conducted using a correlation technique to validate VOM and presented using a graphical method. Pearson's correlation coefficient was employed to examine the strength and direction of relationships between key variables: learning through class activities, enjoyment, applicability, and knowledge gained. The analysis was performed using spreadsheet-based statistical computation. Correlation analysis was selected as an exploratory statistical method to examine associations between perceived engagement variables and learning outcomes, acknowledging that correlation does not imply causation. It justifies the relationship between parameters, that are learning through activities, enjoyment, applicability, and knowledge gained.

The integration of qualitative classroom observation and quantitative correlation analysis provided methodological triangulation, thereby strengthening the internal validity of the proposed framework. The study was concluded, defining further future scope for the VOM method.

Results and Discussions

The courses in which these activities were implemented were GIS, Planning Studio, Social Values in Placemaking, Architecture Design-I, Research Methodology, and Sustainable Real Estate. Some courses sounded boring to students, yet they were important like Research Methodology, while others sounded important and fun like GIS. Both subjects needed special attention. The imperative aspect was to keep students engaged in class and ensure that they learned the content while keeping it interesting so that they wanted to attend classes. These activities were designed to answer the research questions mentioned earlier in the paper. The following were the designed activities that were used in the classroom based on course requirements, students' requirements, and course outcomes.

A. Generating the need for every topic

Generating the need for each topic by connecting it to real-life scenarios enhanced relevance and made learning more engaging and memorable for students. This approach helped learners see the practical value of knowledge and motivated them to understand and apply concepts actively. Such connections also fostered critical thinking and problem-solving skills, which were essential for real-world challenges. This was achieved by asking students to read newspaper articles and reflect upon them. Other methods included giving examples from real-life scenarios, showing videos from officials involved with government, corporations, and businesses, taking students on-site, and calling alumni and experts for discussions to explain course relevance and job opportunities. By giving students real-life problems to analyze and applying solutions to those problems, the activity achieved BT level 3 (Apply) and BT level 4 (Analyze).

B. Breakpoint activity: Dividing the lecture into four parts

Breakpoint Activity in a teaching-learning context referred to strategically segmenting a lecture into several distinct parts, each followed by an interactive or engaging activity. This method was designed to enhance learning by breaking the monotony of traditional lectures and promoting active participation among students.

- **Dividing the Lecture:** The lecture was divided into four parts, with each segment focusing on a specific topic or subtopic. This division allowed for a more organized delivery and helped students absorb information in manageable chunks.
- **Incorporating Interactive Activities:** To promote active participation, small activities like polls, value lines, visible questions, STAD, etc., were incorporated.
- **Benefits of Breakpoint Activity:** The activity resulted in enhanced engagement, improved retention, and immediate feedback for improvement. As the activities demanded that students understand the concept and apply it to give answers, they achieved BT level 2 (Understand) and BT level 3 (Apply).

C. Conducting Site visits and Guest lectures

The University emphasized industry orientation and practical learning for every course; therefore, site visits and guest lectures were consistently included as part of the teaching methodology. In a year, nine site visits, three guest lectures, and four in-house guest lectures were conducted. Site visits and guest lectures served as vital components of a comprehensive educational experience for several reasons, including real-world application, exposure to industry, networking opportunities, and diverse perspectives. Incorporating these experiences into coursework enriched learning, bridged the gap between theoretical knowledge and practical application, and prepared students for future professional challenges. Students were introduced to assignments based on guest lectures and site visits. These helped them analyze

course content in real-life contexts, while the assignments helped them apply the information gathered in finding solutions. Therefore, the activities achieved BT level 3 (Apply) and BT level 4 (Analyze).

D. Hands-on assignments and activities to deliver the course

Hands-on assignments specifically related to the course were incorporated to reflect learning from site visits, guest lectures, and classroom sessions. Hands-on assignments were crucial for student learning as they engaged students actively and allowed them to apply theoretical knowledge in practical scenarios. This form of learning enhanced understanding by encouraging students to experiment and solve problems first-hand, which aided in retaining information more effectively. Hands-on activities catered to various learning styles, particularly benefiting learners who thrived on tangible interaction. Moreover, these assignments developed critical soft skills like creativity, problem-solving, and teamwork. By providing a real-world context, hands-on assignments made learning more relevant and exciting, significantly boosting motivation and the overall educational experience. When assignments were creative and context-based, they also helped in avoiding plagiarism. The hands-on assignments related to Architecture and Urban Planning were at BT level 6, requiring students to create designs and proposals based on site analysis, while in MBA courses these assignments involved evaluation of buildings, financial analysis, and framework creation. Creative and course-based assignments led to achieving BT levels 3 (Apply), 5 (Evaluate), and 6 (Create).

E. Connecting course with other courses and how they can use it

Connecting knowledge across courses helped students see the interdisciplinary nature of learning and enabled them to apply concepts comprehensively across different subjects. This approach deepened understanding and reinforced learning, making it more coherent and meaningful. It also prepared students to solve complex problems using a multidisciplinary perspective, which was crucial in real-world situations. Linking courses fostered a more integrated knowledge base and enhanced students' ability to innovate and adapt in their future careers. For example, GIS was used in Planning Studio for mapping and was also applied in programs related to environment, transportation, big data, sociology, and sustainability. Using knowledge from one course in others led to applying, analyzing, and evaluating concepts. Therefore, it achieved BT levels 3 (Apply), 4 (Analyze), and 5 (Evaluate).

F. Using creative tools and technology

Technology enabled personalized learning, catered to individual needs, and improved educational outcomes. It prepared students for a digital future and equipped them with essential workplace skills. Digital tools increased accessibility for students in remote areas or those who were absent and promoted creativity and critical thinking. It enhanced collaborative

activities and provided a platform for the same. It also enhanced transparency and made learning more equitable. Technologies were used to apply, analyze, evaluate, and create. They were used in submissions, creation, and assessment. Virtual labs were helpful for science and engineering subjects, although gaps remained for architecture and planning courses. Using technology in class achieved BT levels 3 (Apply), 4 (Analyze), 5 (Evaluate), and 6 (Create). Some of the software used were:

- Geographic Information System (GIS): To create maps and analyze data, presentation of the dataset in a creative way
- Auto-CAD: To create building designs
- Photoshop: To make interactive sheets
- Sketch-up: To create a quick 3-D
- MS- Office: To develop documents, excel sheets, and creative presentations
- Mentimeter: To take polls and quizzes, create a word cloud, and take feedback
- Kahoot: For game-based learning
- Socrative and Google quizzes: For quizzes and their evaluation
- EdPuzzle: to create interactive video sessions with quizzes
- Google Forms: To conduct and analyze surveys and feedback
- Canva, Google Classroom, Blackboard: To share material, give assignments, submissions, and assessments
- Canvas: Online tool to create presentations, posters, images, videos, etc

G. Keep taking live feedback using Mentimeter and incorporating suggestions

Incorporating Continuous student feedback allowed adjustments in teaching methods and content in real time, enhancing the educational experience and improving course quality. It made students feel valued and involved, increasing engagement and motivation. Continuous feedback helped pinpoint areas where students struggled and allowed timely interventions. Two feedback cycles were conducted: mid-course and end-term feedback.

1. Mid-course Feedback

Mid-course feedback was used to incorporate suggestions and revise topics that were not well grasped. It helped identify improvement areas for upcoming sessions and improvisations for subsequent academic cycles. It also made students feel involved and responsible as their suggestions were incorporated. For mid-course feedback, the questions given are presented in Table 1, while the creative results of one course are generated using Mentimeter. Feedback at this stage helps the teacher by highlighting improvement areas in the immediate upcoming sessions and also, improvising the course for the next year. Another advantage is that students feel involved in the course curriculum and feel responsible because their suggestions are being incorporated.

Table 1. Mid-course feedback questions

S. No.	Question	Options
1	Do you understand everything so far?	Yes, No, Kind of
2	How much of the content (taught till now) do you understand?	<25%, 25-50%, 50-75%, >75%
3	Write down one key takeaway or what you enjoyed the most.	Open-ended
4	What is still unclear?	Open-ended
5	Which way (activity) of class interaction or teaching do you like best?	Open-ended
6	Any questions or doubts?	Open-ended

2. End-term feedback

The end-term feedback was taken on the last day of the class to understand the lacunae and strengths of the course. It highlighted the areas that needed attention and helped in mapping program outcomes. For end-term feedback, the questions given are presented in Table 2. This gave students an understanding of evaluation and made them feel empowered as their opinions were heard and incorporated for the betterment of the course for the batches to come. This achieved BT level 5 (Evaluation).

Table 2. End-term feedback questions

S. No.	Question	Options
1	Did you enjoy the course?	Yes, No, No Opinion
2	How applicable and important is this course in real life?	Lowest (1, 2, 3, 4, 5) Highest
3	How much do you understand from the content delivered?	<25%, 25-50%, 50-75%, >75%
4	Were the site visit and guest lecture helpful?	Yes, No, Maybe
5	What do you think about the activities conducted in the class?	They were good and I learned better, They were alright, They were not required, More activities required
6	Out of the conducted activities, which one was your favorite?	Open-ended
7	Any suggestions and feedback?	Open-ended

The results presented below are the collation of all three courses (Sustainable Real Estate, Research Methodology, and Social Values in Placemaking) where end-term feedback was implemented. A total of 108 surveys were collected from the students. *Fig. 2* presents the graphical presentation of the survey feedback. A total of 95% of students responded that they enjoyed the course. Most students agreed that courses hold high value in the real-life scenario and 78% agreed that it is important, which also shows that the real-life need of the course were generated by the teacher. In terms of course understanding, 53% of students responded that they understood more than 75% of the course content and 42% understood the content between 50-75%. Only 5% of students responded to understanding between 25-50%, while none responded to less than 25%. Students also

gave feedback on activities, three-fourths (73%) of the students opined that the activities were good and helped them learn better, while 26% opined that they were alright.

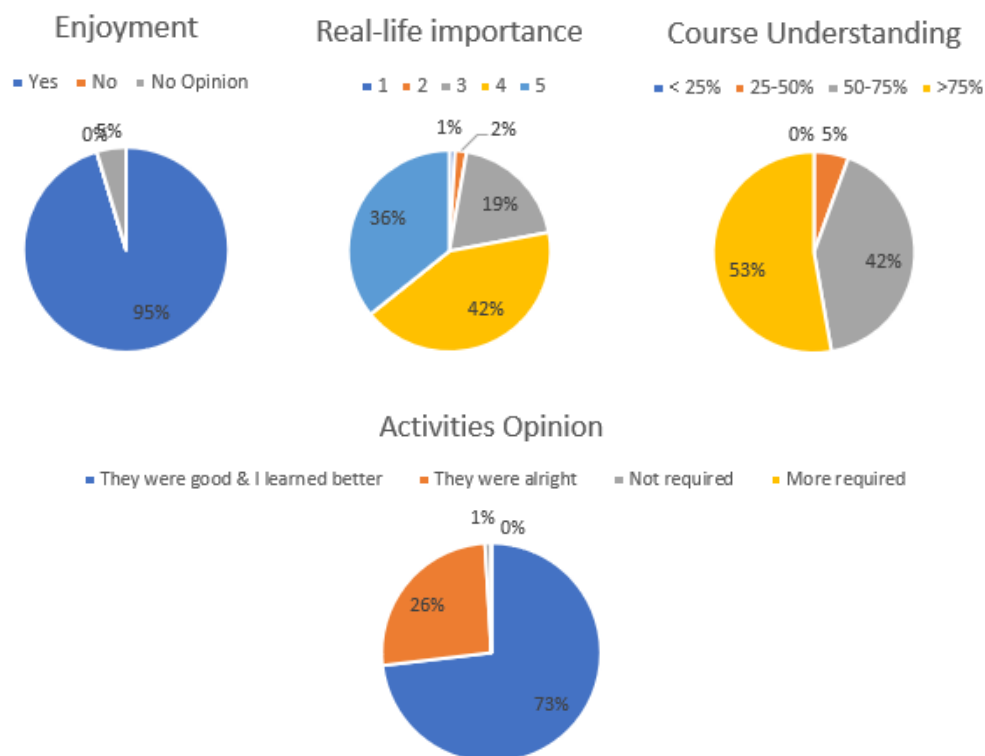


Fig. 1. Results of end-term feedback to validate visual outcome mapping

Almost, negligible students responded that activities in the class were not helpful. Therefore, it can be concluded that all types of students (winners, active runners, survivors, and outsiders). It shows that students enjoy the course when activities are used for learning in the classroom. For better course understanding it is important to relate the course to the real-life scenario as well. Students feel included and responsible when their opinions are included in the teaching design. The major activities that students enjoyed were flipped classrooms, competitive quizzes, value lines, debates, group discussions, case studies analysis, and site visits. Students specifically added that enjoyed good visual and graphical presentations by the teacher and it helped them learn more, which highlights the importance of audio-visuals in the classroom. It helped in better learning outcomes and achieving higher-order learning skills.

Table 3. Correlation Analysis of end term feedback

	Enjoyment	Applicability	Knowledge Gained	Learning through class activities
Enjoyment	1.00			
Applicability	0.14	1.00		
Knowledge Gained	0.17	0.43	1.00	
Learning through class activities	0.15	0.33	0.47	1.00

The correlation Table 3, highlights the relationships between enjoyment, applicability, knowledge gained, and learning through class activities. Enjoyment has a weak positive correlation with applicability (0.14), knowledge gained (0.17), and learning through class activities (0.15), suggesting that while enjoyment plays a role, it is not strongly tied to the other factors. Applicability has a moderate positive correlation with knowledge gained (0.43) and learning through class activities (0.33), indicating that students perceive knowledge and activities as more meaningful when they see real-world applications. Lastly, learning through class activities has the strongest correlation with knowledge gained (0.47), showing that interactive learning methods significantly enhance knowledge acquisition. Overall, the findings suggest a need to strengthen the integration of enjoyment and applicability to create a more holistic learning experience.

H. Visual Outcome Mapping

The visual outcome mapping was done between the challenges faced in the class and how they were resolved using various activities in the class and was presented in Fig. 3. The hands-on assignments curbed plagiarism and improved critical thinking, while they addressed the problem of mobile usage in the class as students were working on assignments. For some of the assignments, it was encouraged to use phones for reading articles or doing analysis during the class. The use of technology was maximized with hands-on assignments, while peer review of these assignments helped students to understand the art of evaluation. This activity helped in achieving Bloom's Taxonomy levels 3 (Apply), 5 (Evaluate), and 6 (Create). The breakpoint activities helped break the monotony of the class and increased concentration; it helped in making the class interesting and took care of mobile situations. The retention and listening concentration of students ranged from 10–15 minutes, and introducing the activity at that point improved retention.

This also helped in better understanding of the course (BT level 2) and applying the knowledge (BT level 3) through short activities. The site visits and guest lectures helped make the class more interesting by changing the class environment and listening to the experts. These helped in shifting the dynamics and making the class interesting by relating the subject to a real-life scenario. Additionally, it achieved BT levels 3 and 4 by helping students learn how to apply the information in real life and analyze the context with the help of dedicated assignments.

Using creative tools and technology in class was the need of the hour as the generation was tech-savvy (Gen Z) and related more where there was a use of creative tools and software related to the courses. The advantage of using technology was multifold: it made the class interesting, promoted technological advances in teaching, students were not distracted from phones as they had alternate technology options, and they felt more inclusive and responsible

in the class. This helped achieve various higher-level orders of learning that included BT levels 3 (Apply), 4 (Analyze), 5 (Evaluate), and 6 (Create).

Visual Outcome mapping

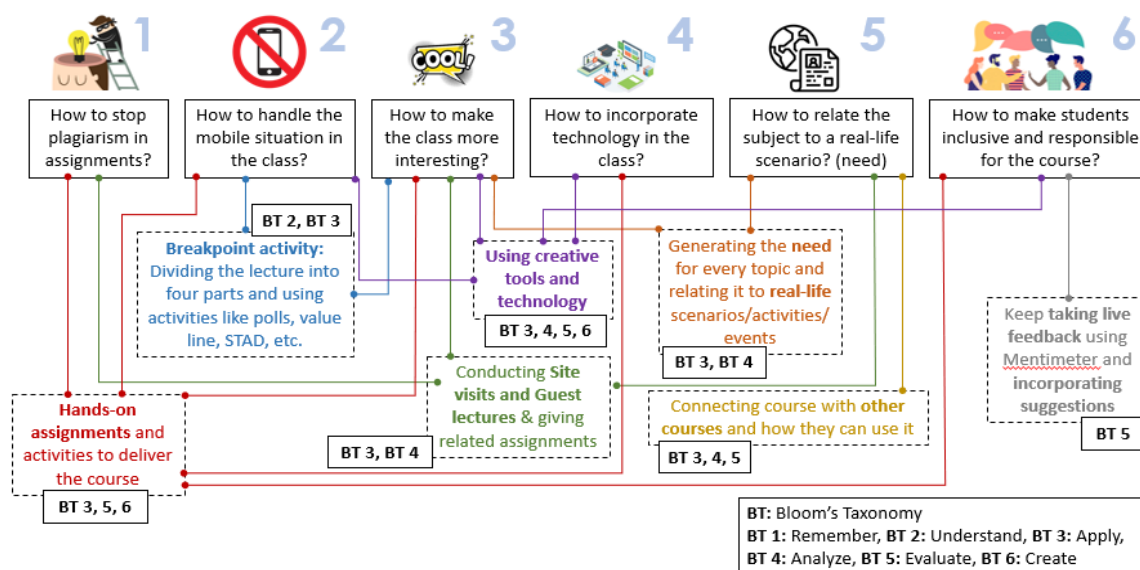


Fig 2. Visual Outcome Mapping of challenges and activities outcomes

Tools and software were used to apply the course understanding in terms of analyzing and evaluating the facts and given information and creating solutions in terms of framework, policies, plans, and designs. In order to generate the needs of the course, it was important to connect it with real-life scenarios and other courses to make it multidisciplinary in nature. It achieved BT levels 3, 4, and 5 by applying the knowledge of the course in the real world and by analyzing and evaluating the information to solve real-life issues and use the knowledge in the other courses. For e.g., the knowledge of the Research Methodology course was used in planning, designing research proposals, making research questions, designing and improving writing skills, and writing papers. Live feedback was taken by asking questions using Mentimeter and also by a traditional method of show of hands, which allowed the faculty to judge the level of understanding of the topic. It was a very good way of analyzing content penetration in the students and also worked as a quick revision technique. Taking mid-course feedback was important to evaluate the understanding of students and to make them feel included by incorporating their suggestions, while end-term feedback was important for improvement in the course. This not only made students feel included in the course designing process, but they also felt responsible for the same. It helped in achieving a very important skill of evaluation which achieved BT level 5.

Conclusion

The activities used were a mix of active, reflective, and collaborative learning, and students took an interest in classes and even connected with teachers outside the classroom

and asked about the subject because they felt inclusive. The assignments created can be developed and published as reports and papers. Students being able to use the knowledge in the field, job, and other courses in a multidisciplinary manner is equally important, and therefore, every course was related to real-life scenarios and other courses. The real-life scenario involved the use of the latest examples, knowledge, case studies, guest lectures, site visits, and software use. All course outcomes were achieved, some with the help of activities and the hands-on assignment. This piqued students' interest in the course, and incorporating feedback helped them become part of the course design and delivery. Technology played an important part in all the assignments, which is critical for today's generation of students. The survey suggested that activities were enjoyed by all categories of students (winners, active runners, survivors, and outsiders), and helped them learn better. The results emphasize that learning through class activities significantly enhances knowledge gained, while applicability in real life moderately supports meaningful learning. However, enjoyment shows weaker correlations, highlighting an opportunity to make learning experiences more engaging and impactful. The mapping clearly outlines that even the smallest of activities could help in achieving higher-order skills in Bloom's taxonomy. The application of the activities has been done in postgraduate courses, but the same could be implemented in graduate courses as well. This paper works as a framework for mapping the outcome of class activities in solving issues that are mentioned in the paper and also achieving higher-order skills. In the future, the impact of each strategy can be explored individually to have a better understanding of the achievements, outcomes, and assessments of the activities could also be studied.

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Conflict of Interest

The authors declare no conflict of interest.

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